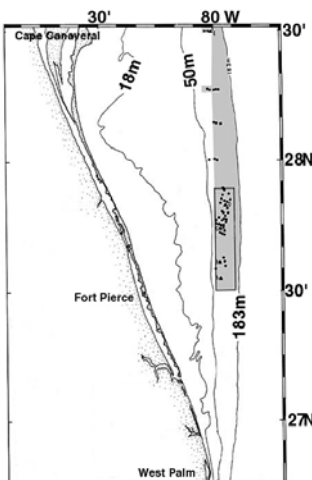




Final
AMENDMENT 13A
TO THE
FISHERY MANAGEMENT PLAN
FOR THE
SNAPPER GROUPER FISHERY
OF THE
SOUTH ATLANTIC REGION

**INCLUDING AN ENVIRONMENTAL
ASSESSMENT, INITIAL REGULATORY FLEXIBILITY ANALYSIS,
REGULATORY IMPACT REVIEW AND SOCIAL IMPACT ASSESSMENT/
FISHERY IMPACT STATEMENT**



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PROPOSED ACTION AND PREFERRED ALTERNATIVE

PAGE

PROPOSED ACTION:

Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species. 119

Preferred Alternative:

Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an indefinite period with a 10-year re-evaluation by the Council. The Council will review the configuration and size of the *Oculina* Experimental Closed Area within 3 years of the publication date of the final rule. 119

ENVIRONMENTAL ASSESSMENT

This integrated document contains all elements of the Plan Amendment, Environmental Assessment (EA), Initial Regulatory Flexibility Analysis (IRFA) (Effect on Small Businesses), Regulatory Impact Review (RIR), and Social Impact Assessment/Fishery Impact Statement (SIA/FIS). The table of contents for the EA is provided separately to aid the reviewer in referencing corresponding sections of the Amendment.

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Notice of Intent to prepare a SDEIS published:	January 31, 2002
Scoping meetings:	March 3, 2002 in Savannah, Georgia March 5, 2001 in Jekyll Island, Georgia
Public Hearing:	June 16, 2003 in Cocoa Beach, Florida
Decision to prepare an EA (<i>Federal Register</i> notice):	September 12, 2003
EA/FONSI to NOAA Fisheries:	October 23, 2003

REGULATORY IMPACT REVIEW

This integrated document contains all elements of the Plan Amendment, Environmental Assessment (EA), Initial Regulatory Flexibility Analysis (IRFA) (Effect on Small Businesses), Regulatory Impact Review (RIR), and Social Impact Assessment/Fishery Impact Statement (SIA/FIS). The table of contents for the RIR is provided separately to aid the reviewer in referencing corresponding sections of the Amendment.

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INTRODUCTION

The Regulatory Impact Review (RIR) is part of the process of developing and reviewing fishery management plans, amendments and seasonal adjustments, and is prepared by the regional fishery management councils with assistance from NOAA Fisheries, as necessary. The regulatory impact review provides a comprehensive review of the level and incidence of economic impact associated with the proposed regulatory actions.

Executive Order 12866 requires that a Regulatory Impact Analysis be prepared for all regulatory actions that are of public interest. To meet this mandate NOAA Fisheries requires that the Council prepare a Regulatory Impact Review (RIR) for proposed actions. The RIR does three things: 1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action, 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem, and 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed actions are a “significant regulatory action” under certain criteria provided in Executive Order 12866. This RIR analyzes the probable impacts on society from the proposed action in this amendment to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (FMP).

In addition, information from the RIR is used to assess the impacts of the proposed actions on small entities. Under the criteria set forth by the Small Business Administration’s Regulatory Flexibility Act (RFA) it was uncertain whether this proposed action will have a significant effect on

a substantial number of small entities, and an IRFA was prepared (Section 4.9). The criteria used to determine significance under the RFA should not be confused with those used for a determination of significance under E.O. 12866.

PROBLEMS AND OBJECTIVES

Problems and objectives addressed by this amendment, and the purpose and need for this amendment, are found in Section 1.0 of this document. This proposed management action will extend the deadline for an existing closure on the *Oculina* Bank Experimental Closed Area for an indefinite time period to: 1) act as a hedge against the uncertainty inherent in stock assessments and 2) provide the highest protection to the *Oculina* coral habitat in the closed area.

METHODOLOGY AND FRAMEWORK FOR ANALYSIS

The RIR assesses management measures from the standpoint of determining changes in costs and benefits to society. The net effects should be stated in terms of changes in producer surplus or net profits to the commercial harvesting and for-hire sectors and consumer surplus to the private recreational fishing sector and final consumers of the resource. The commercial harvesting sector refers to harvesters, processors and dealers of snapper grouper species. Final consumers of the resource refer to the individuals that derive benefits from consuming snapper grouper species. Also, non-use value to the general public from the increase in fish populations, improvements in the coral habitat and protection of biodiversity within the closed area are considerations in weighing benefits and costs of the proposed action and alternatives.

Ideally, all of these changes in costs and benefits should be accounted for in assessing the net economic benefits to society from this management measure. However, lack of data do not allow for these types of analyses and these impacts can only be presented in a qualitative manner. In order to quantitatively assess the costs and benefits of these alternatives, the following models would have to be developed:

1. Expected demand models for commercial, private recreational and for-hire recreational fishing effort in the *Oculina* Experimental Closed Area. Data for these models would have to be collected from contingent choice surveys of the commercial harvesting, for-hire recreational and private recreational fishing sectors within the South Atlantic Council's area of jurisdiction. These hypothetical demand models would have to account for changes in participation (as it relates to fishing conditions and fishing quality) inside and outside the closed area. The cost for data collection and analyses could exceed \$400,000.
2. Econometric models of the relationship between cost of fishing as it relates to population size (catchability), distance, input costs and other relevant factors for both the recreational and commercial fishing sectors. The costs for data collection and analyses could exceed \$300,000.
3. Valuation models to determine non-use value and its relationship to population improvements, increase in biodiversity, protection of the *Oculina* coral and protection of candidate species. The costs for data collection and analyses could exceed \$300,000.
4. A market demand model for snapper grouper species that are resident in the closed area. The costs for data collection and analyses could exceed \$100,000.
5. A bioeconomic model that incorporates the necessary predictive biological models and the econometric models described in items 1 through 4. This model would weigh the costs and benefits of the various alternatives, and allow for calculating the "optimal closure period". The cost of formulating this type of optimal control model could exceed \$200,000.

The detailed discussions for the proposed action and its alternatives are incorporated in the text under economic impacts in Section 4.2. Impacts are summarized in Table 1.

Summary of expected changes in net benefits (Summary of Regulatory Impact Review- RIR)

Table 1. Summary of expected changes in net benefits.

ALTERNATIVES	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
<p>Alternative 1. Preferred – Extend regulations within the <i>Oculina</i> Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an indefinite period with a 10-year re-evaluation by the Council. The Council will review the configuration and size of the <i>Oculina</i> Experimental Closed Area within 3 years of the publication date of the final rule.</p> <p>Alternative 2. Extend the regulations within the <i>Oculina</i> Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 10-year period.</p> <p>Alternative 3. Extend the regulations within the <i>Oculina</i> Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 20-year period.</p> <p>Alternative 4. Extend the regulations within the <i>Oculina</i> Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 50-year period.</p> <p>Alternative 5. Extend the regulations within the <i>Oculina</i> Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an indefinite period.</p>	<p>The preferred alternative, and alternatives 2, 3, 4 and 5 will result in a continuation of non-use* benefits to the public from the <i>Oculina</i> coral, biodiversity and fish populations inside the closed area. Also, the value of the hedge against future uncertainty in stock assessments will continue. The indirect benefits to the commercial harvesting, for-hire and recreational fishing sectors that were initiated during the period of the first closure will continue. As conditions improve in the closed area, these benefits will increase over time at a decreasing rate. In any one time period, the magnitude of the indirect use benefits and the non-use benefits from fish populations will depend on conditions outside the area. It is not possible to rank these alternatives since the magnitude and rate of change of these benefits are unknown due to data limitations.</p>	<p>For the preferred alternative, and alternatives 2, 3, 4, and 5, there will be forgone consumer surplus benefits to part of the recreational sector operating from the “area of interest”. Also, there will be forgone net revenue to a portion of the charter and commercial harvesting sectors operating from the “area of interest”. As conditions improve in the closed area relative to the area outside, these costs will increase over time, at a decreasing rate. In any one time period, the magnitude of the cost to all sectors will depend on the quality of fishing at other sites in the fisherman’s choice set. It is not possible to rank these alternatives since the magnitude and rate of change of these costs are unknown due to data limitations.</p>	<p>A determination of net economic benefits of the preferred alternative and alternatives 2, 3, 4 and 5 depends on the magnitude of the aggregate benefits and costs, and the “optimal” closure period. Thus alternatives could not be ranked.</p>

Table 1. Continued.

ALTERNATIVES	POSITIVE IMPACTS	NEGATIVE IMPACTS	NET IMPACTS
Alternative 6. No action. The regulations that prohibit fishing for and retention of snapper grouper within the <i>Oculina</i> Experimental Closed Area will sunset on June 27, 2004.	In the short-term, alternative 6 would allow for increased non-market benefits to the recreational fishing sector and increased net revenue to the charter and commercial harvesting sectors.	The “no action” alternative (Alternative 6) could result in reduced use and non-use economic benefits if further depletion of the overfished snapper grouper species occurred as a result of increased fishing effort. In addition, it is expected that over time there would be a reduction of non-use benefits and indirect use benefits from further habitat degradation.	The net economic effect from the “no action” alternative could be negative given the current degraded condition of the <i>Oculina</i> coral, the overfished state of some snapper grouper species and the uncertainty in stock assessments.

*Note: Non-use value as used in this table includes quasi-option value, existence value and bequest value.

The economic effects from reopening the *Oculina* Experimental Closed Area could not be determined because of current data limitations. Nevertheless, estimates of the current value of commercial and recreational fishing for the east coast of Florida (Section 3.2.2), and the estimated economic effects of the fishery operating out of the “area of interest” (Section 4.2), provide the justification for concluding that the effect of this action will not exceed \$100 million or adversely affect the economy, a sector of the economy, productivity, competition, jobs, or communities.

It is estimated that the snapper grouper recreational fishery in the Exclusive Economic Zone (EEZ) off Florida generates \$15 million in trip expenditures annually (Table 10b). The likely annual spending for the private recreational sector operating out of the “area of interest” is \$3.87 million and consumer surplus benefits are calculated as \$1.45 million (Table 25b). Gross revenue for charter vessels home ported in the “area of interest” is estimated at \$1.86 million per year and net revenue for these charter vessels is \$1.03 million (Table 25a). Ex-vessel revenue from snapper grouper species for the entire commercial harvesting sector in Florida (excluding the keys) was \$3.6 million in 2001 (Table 13a). Commercial harvesting vessels homeported in the “area of interest” likely earn a total of \$1.3 million in gross revenue (\$0.32 million net revenue) annually from snapper grouper fishing (Table 25c).

It should be noted that these economic value estimates do not represent the foregone use value associated with this proposed management action. They simply put these opportunity costs in context and assist in evaluating whether the action is significant under the E.O. 12866 criteria discussed in the previous paragraphs.

In addition, this measure is not likely to have an adverse effect on the environment, public health or safety, or state, local, or tribal governments. Furthermore, the proposed measure will not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency, will not materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof. Since this preferred alternative is a continuation of an existing prohibition that was implemented in 1994, it is not expected to raise novel legal or policy issues. **Thus, this proposed rule is not significant under E.O. 12866.**

SOCIAL IMPACT ASSESSMENT/FISHERY IMPACT STATEMENT

This integrated document contains all elements of the Plan Amendment, Environmental Assessment, Initial Regulatory Flexibility Analysis (IRFA) (Effect on Small Businesses), Regulatory Impact Review (RIR), and Social Impact Assessment/Fishery Impact Statement (SIA/FIS). The table of contents for the SIA/FIS is provided separately to aid the reviewer in referencing corresponding sections of the Amendment.

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INTRODUCTION

Mandates to conduct Social Impact Assessments (SIAs) come from both the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and the National Environmental Policy Act (NEPA). NEPA requires Federal agencies to consider the interactions of natural and human environments by using a “systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making” [NEPA section 102 (2) (a)]. Under the Council on Environmental Quality’s (CEQ, 1986) *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* a clarification of the terms “human environment” expanded the interpretation to include the relationship of people with their natural and physical environment (40 CFR 1508.14). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects which may be direct, indirect or cumulative (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 1994).

Under the MSFCMA, fishery management plans (FMPs) must “...achieve and maintain, on a continuing basis, the optimum yield from each fishery” [MSFCMA section 2 (b) (4)]. When considering “a system for limiting access to the fishery in order to achieve optimum yield” the Secretary of Commerce and Regional Fishery Management Councils are to consider both the social and economic impacts of the system [MSFCMA section 303 (b) (6)]. Recent amendments to the MSFCMA require that FMPs address the impacts of any management measures on the participants in the affected fishery and those participants in other fisheries that may be affected directly or indirectly through the inclusion of a fishery impact statement [MSFCMA section 303 (a) (9)]. Most recently, with the addition of National Standard 8, FMPs must now consider the impacts upon fishing communities to assure their sustained participation and minimize adverse economic impacts upon those communities [MSFCMA section 301 (a) (8)]. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. With an increasing need for management action, the consequences of such changes need to be examined in order to mitigate the negative impacts experienced by the populations concerned.

PROBLEMS AND METHODS

Social impacts are generally the consequences to human populations that follow from some type of public or private action. Those consequences may include alterations to “the ways in which people live, work or play, relate to one another, organize to meet their needs and generally cope as members of a society...” (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 2003). In addition, cultural impacts which may involve changes in values and beliefs which affect people’s way of identifying themselves within their occupation, communities and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Therefore, it is extremely important that as much information as possible concerning a fishery and its participants be gathered for an assessment. Although public hearings and scoping meetings do provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

Without access to relevant information for conducting social impact analyses it is important to identify any foreseeable adverse effects on the human environment. With quantitative data lacking, qualitative data can be used to provide a rough estimate of some impacts. In addition, when there is a body of empirical findings available from the social science literature, it needs to be summarized and referenced in the analyses.

In attempting to assess the social impacts of the proposed amendment it must be noted that data available for these analyses still do not represent a comprehensive overview of the fishery; therefore, the analyses do not include all social impacts. Information that was available pertains primarily to the commercial harvesting sector of the snapper grouper fishery. Thus social impacts on non-commercial harvesters, the processing sector, the consumer, fishing communities, and society as a whole are not fully addressed due to data limitations. The fishery impact statement consists of the description of the commercial sector of the fishery, some basic indicators of recreational activity, and the social impacts under the alternatives considered. Data to define or determine impacts upon fishing communities are still limited.

One last note about the data and methods used in the social analysis sections: they are not the same as those used in the economic analysis section, and a reading of the biological, economic and social data may produce both different analyses and outcomes. However, that is a strength of multi-disciplinary studies; instead of having only one perspective of the problem, we are afforded many and hence our comprehension grows and improves.

SOCIAL IMPACT SUMMARY

Table 2. Social impact (SIA/FIS) summary.

ACTION	SOCIAL IMPACTS
Alternative 1. Preferred – Extend regulations within the <i>Oculina</i> Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an indefinite period with a 10-year re-evaluation by the Council. The Council will review the configuration and size of the <i>Oculina</i> Experimental Closed Area within 3 years of the publication date of the final rule.	Minimal negative social impacts are predicted for all user groups as the closure has been in place for the past 10 years. Positive long-term social benefits will accrue from probable increases in snapper and grouper stocks and the “legacy benefit” to future generations. This alternative is also formulated to be adaptive management, and hence is more flexible and responsive to the public’s needs and concerns. This leads to better compliance with and enforcement of regulations.
Alternative 2. Extend the regulations within the <i>Oculina</i> Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 10-year period.	As with the preferred alternative, long-term benefits must be accorded to the fact that the closure is protecting a unique area of habitat and species in the snapper grouper management unit. This protection thus brings non-use and potential future-use benefits to the local communities and to the general population of the United States. However, unlike the preferred alternative, this measure is less beneficial as it is not adaptive in essence.
Alternative 3. Extend the regulations within the <i>Oculina</i> Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 20-year period.	Extending the closure of the <i>Oculina</i> Experimental Closed Area for an additional 20-year period poses the same positive and negative benefits as the Preferred and Alternatives 2, 4 and 5. However this alternative is not as amenable to the practice of adaptive management as is the preferred alternative.
Alternative 4. Extend the regulations within the <i>Oculina</i> Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 50-year period.	Extending the closure of the <i>Oculina</i> Experimental Closed Area for an additional 50-year period poses the same positive and negative benefits as the preferred and Alternatives 2, 3 and 5. However this alternative is not as amenable to the practice of adaptive management as is the preferred alternative.
Alternative 5. Extend the regulations within the <i>Oculina</i> Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an indefinite period.	The social impacts of this alternative would be similar to those described for Alternative 1, with the following exception. By failing to specify one or more scheduled reviews, Alternative 5 may reduce the likelihood that the Council would adopt management of the closed area based on new information. Therefore, this alternative would be less responsive to public concerns. This could result in an unwillingness to comply with regulations.
Alternative 6. No action. The regulations that prohibit fishing for and retention of snapper grouper species within the <i>Oculina</i> Experimental Closed Area will Sunset on June 27, 2004.	Letting the area re-open to commercial and recreational snapper grouper fishermen may bring short-term benefits in the form of increased catches and more satisfaction with fishing experiences. It may also bring a short-lived feeling of victory to some who oppose closure of the <i>Oculina</i> Experimental Closed Area. However, the long-term impacts will be negative, resulting in the likely decline in snapper grouper populations within the <i>Oculina</i> Experimental Closed Area. The negative impacts of eliminating the closure thus outweigh any short-term benefits of allowing the regulations to sunset.

SOCIAL IMPACT ASSESSMENT DATA NEEDS

Data needs include two categories: (a) one specific to the coastal areas and populations that are impacted by regulations surrounding the Habitat Area of Particular Concern and the *Oculina* Experimental Closed Area and (b) other general data needs. With regard to the first category (location specific), there is a great need to document the historical, cumulative sociocultural impacts of the *Oculina* Experimental Closed Area upon the fisheries that are found approximately between Cape Canaveral to the north and Fort Pierce to the south. To the best of our knowledge, no one has investigated the impacts on the fishing communities, both recreational and commercial, for this section of Florida. Care should also be taken to include in the Fishery Impact Statement recreational fishermen from inland areas of Florida that travel to the coast regularly to fish. Such work should be part of a wider effort undertaken to catalog the broader effects of the impacts from all regulations on fishing communities in the Council's area of jurisdiction.

The more general, but just as critical, data needs are complete profiles of fishing communities in the South Atlantic. These are just now being built but their usefulness is limited. Much of the ongoing research is piecemeal due to the lack of funds and personnel. Furthermore, the fishing communities' dependence upon fishing and fishery resources needs to be established. In order to achieve these goals, data must be gathered in three or more ways.

First, in order to establish both baseline data and to contextualize the information already gathered by survey methods, there is a great need for an in-depth, ethnographic study of the different fishing sectors or subcultures. Second, existing literature on social/cultural analyses of fisheries and other sources in social evaluation research need to be culled in order to offer a comparative perspective and guide the SIAs. Third, socio-economic data need to be collected on a continuing basis for both the commercial and recreational sectors, including the for-hire sector. Methods for doing this would include regular collection of social and economic information in logbooks for the commercial sector and similar add-ons to the MRFSS data collection system for recreational fishermen.

The following is a guideline for the types of data needed:

1. Demographic information may include but is not necessarily limited to: population, age, gender, ethnic/race, education, language, marital status, children (age and gender), residence, household size, household income (fishing/non-fishing), occupational skills, and association with vessels and firms (role and status).
2. Social structure information may include but is not necessarily limited to: historical participation, description of work patterns, kinship unit, size and structure, organization and affiliation, patterns of communication and cooperation, competition and conflict, spousal and household processes, and communication and integration.
3. Emic culture information may include but is not necessarily limited to: occupational motivation and satisfaction, attitudes and perceptions concerning management, constituent views of their personal future of fishing, psycho-social well-being, and cultural traditions related to fishing (identity and meaning).
4. Fishing community information may include but is not necessarily limited to: identifying communities, dependence upon fishery resources (this includes

recreational use), identifying businesses related to that dependence, and determining the number of employees within these businesses and their status.

This list of data needs is not exhaustive or all inclusive, and this list should be revised periodically in order to better reflect on-going and future research efforts.

Note for CEQ Guidance to Section 1502.22

In accordance with the CEQ Guidance for Section 1502.22 of the NEPA Act (1986), the Council has made “reasonable efforts, in the light of overall costs and state of the art, to obtain missing information which, in its judgment, is important to evaluating significant adverse impacts on the human environment...” However, at this time the Council cannot obtain complete social and community information that would allow the full analysis of social impacts of the proposed action and its alternatives. There is an insufficient number of non-economic social scientists employed at this time (2003) and a severe lack of funds to conduct the community surveys and needed ethnographies that would allow full completion of these analyses. However, the proposed action and its alternatives do not pose grave danger to the fishing communities as discussed in Section 3, Affected Environment, in this document, nor are there expected to be particularly significant adverse affects, as they would extend a rule that has been in effect for almost ten years. While there does exist uncertainty about some of the impacts that may have come from the initial closure of the *Oculina* Experimental Closed Area, the uncertainty is not enough to prevent the Council from taking action and extending the closure.

1.0 INTRODUCTION

1.1 Background

The *Oculina* Bank is a 90-mile strip of coral reefs, located near the continental shelf edge off central eastern Florida. Its name derives from the presence of banks, thickets, and rubble zones of the delicate, slow-growing ivory tree coral (*Oculina varicosa*). The massive thickets formed by this coral support dense and diverse invertebrate and finfish communities (SAFMC 1998c).

The South Atlantic Council recognizes that the *Oculina* Bank is an area of special biological significance. In 1984, the Council designated a 92-nm² portion of the *Oculina* Bank as the *Oculina* Habitat Area of Particular Concern (HAPC) (Figure 1). Additionally, the Council prohibited the use of bottom trawls, bottom longlines, dredges, fish traps, and fish pots within the HAPC to mitigate the threat of fishing gear to *Oculina* coral. These actions were taken through the Fishery Management Plan (FMP)/EIS for Coral and Coral Reefs, prepared jointly by the Gulf of Mexico and South Atlantic Councils (GMFMC and SAFMC 1982).

In Amendment 6/EA to the Snapper Grouper FMP (SAFMC 1993), implemented in 1994, the Council prohibited fishing for and retention of snapper grouper species within the HAPC and prohibited anchoring by vessels fishing for snapper grouper species. The area to which these prohibitions applied became known as the *Oculina* Experimental Closed Area (Figure 2). The intent of these prohibitions was to “enhance stock stability and increase recruitment by providing an area where deep water species can grow and reproduce without being subjected to fishing mortality” (SAFMC 1993). As outlined in Amendment 6, without further action, these regulations would sunset in June 2004.

In January of 1996, regulations in Amendment 3 to the Coral FMP (SAFMC 1995) became effective, which prohibited all fishing vessels from anchoring within the HAPC. Also in 1996, to minimize the impacts of the rock shrimp fishery on essential fish habitat, including the fragile coral species existing in the *Oculina* Bank, the Council prohibited trawling for rock shrimp east of 80°W longitude, between 27°30'N and 28°30'N latitude, in depths less than 100 fathoms. This action was taken through Amendment 1 to the Shrimp FMP (SAFMC 1996). The area to which the prohibition applied became known as the rock shrimp closed area (Figure 3).

In 1998, the Council expanded the *Oculina* HAPC to include the rock shrimp closed area (Figure 4). This action was accomplished through Amendment 4 to the Coral FMP included in the Council’s Comprehensive Habitat Amendment (SAFMC 1998b). Within the expanded HAPC, fishing with a bottom longline, bottom trawl, dredge, fish pot, or fish trap is prohibited, as is anchoring by a fishing vessel (SAFMC 1998b). The prohibition on fishing for and retention of snapper grouper species remains in effect only within the smaller, *Oculina* Experimental Closed Area. That prohibition, which is scheduled to sunset in June 2004, is the subject of this amendment.

2



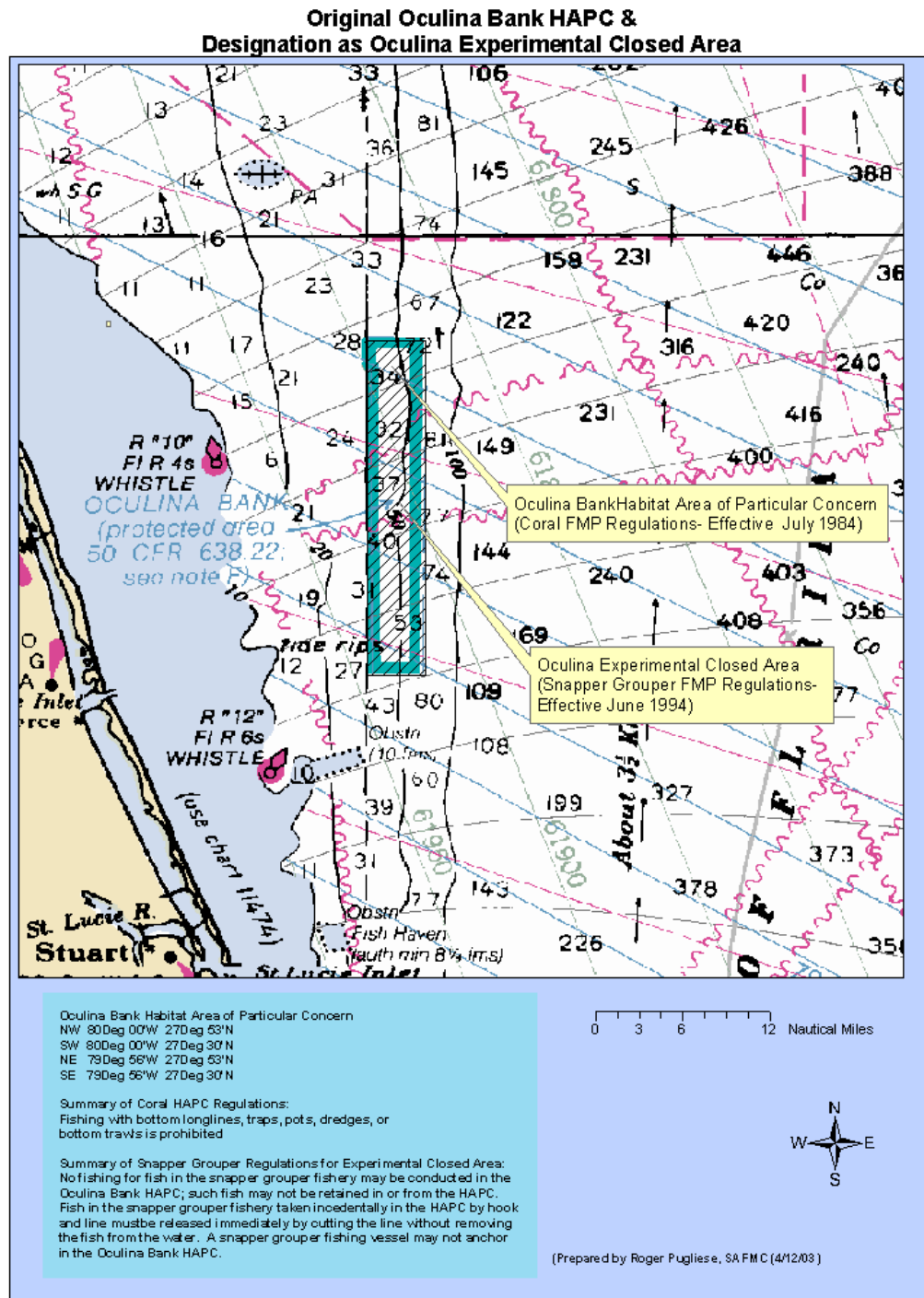


Figure 2. Original *Oculina* Bank HAPC and Designation as *Oculina* Experimental Closed Area.

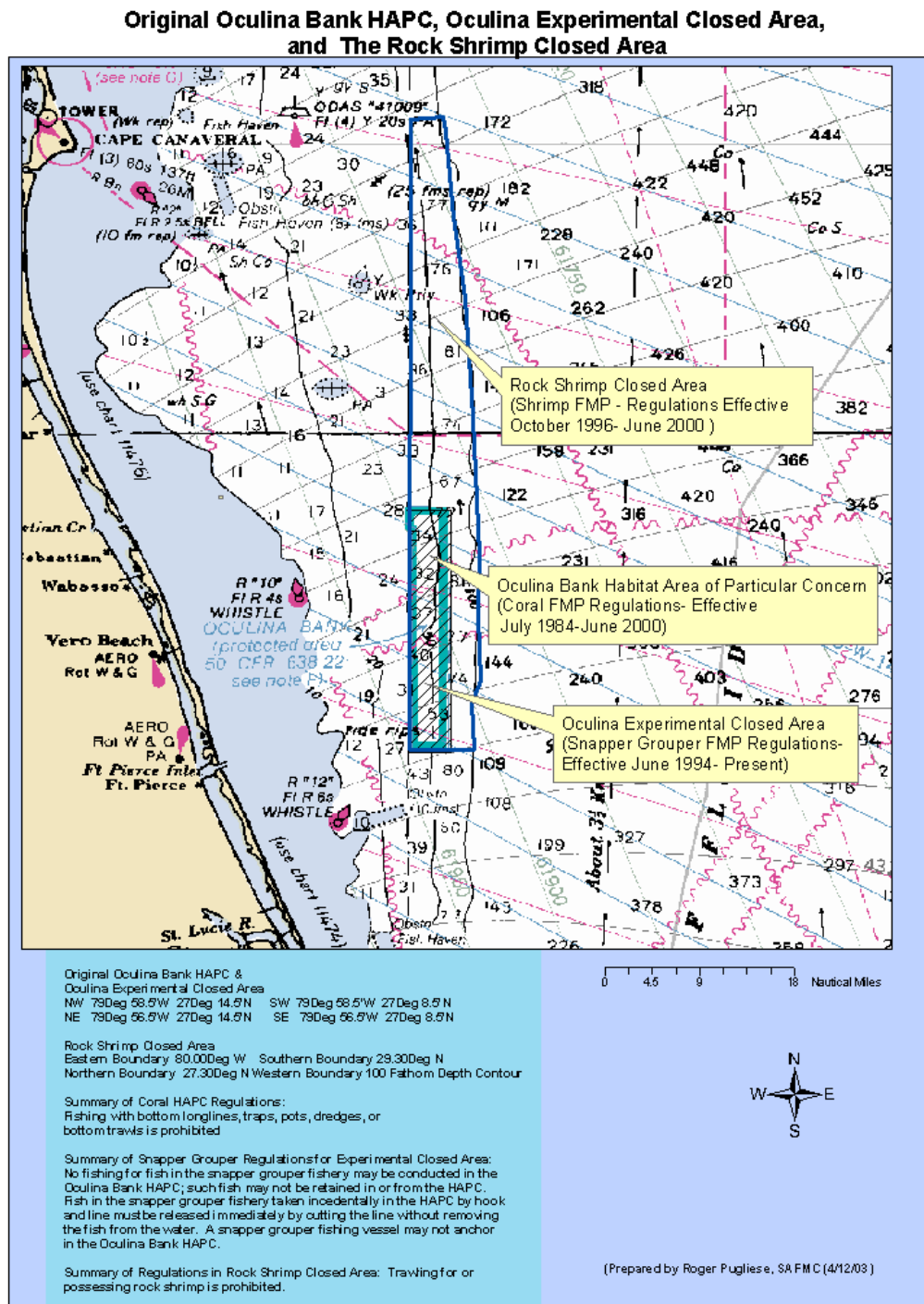


Figure 3. Original *Oculina* Bank HAPC, *Oculina* Experimental Closed Area, and the Rock Shrimp Closed Area.

Expanded Oculina Bank HAPC, Satellite Oculina HAPCs and Oculina Experimental Closed Area.

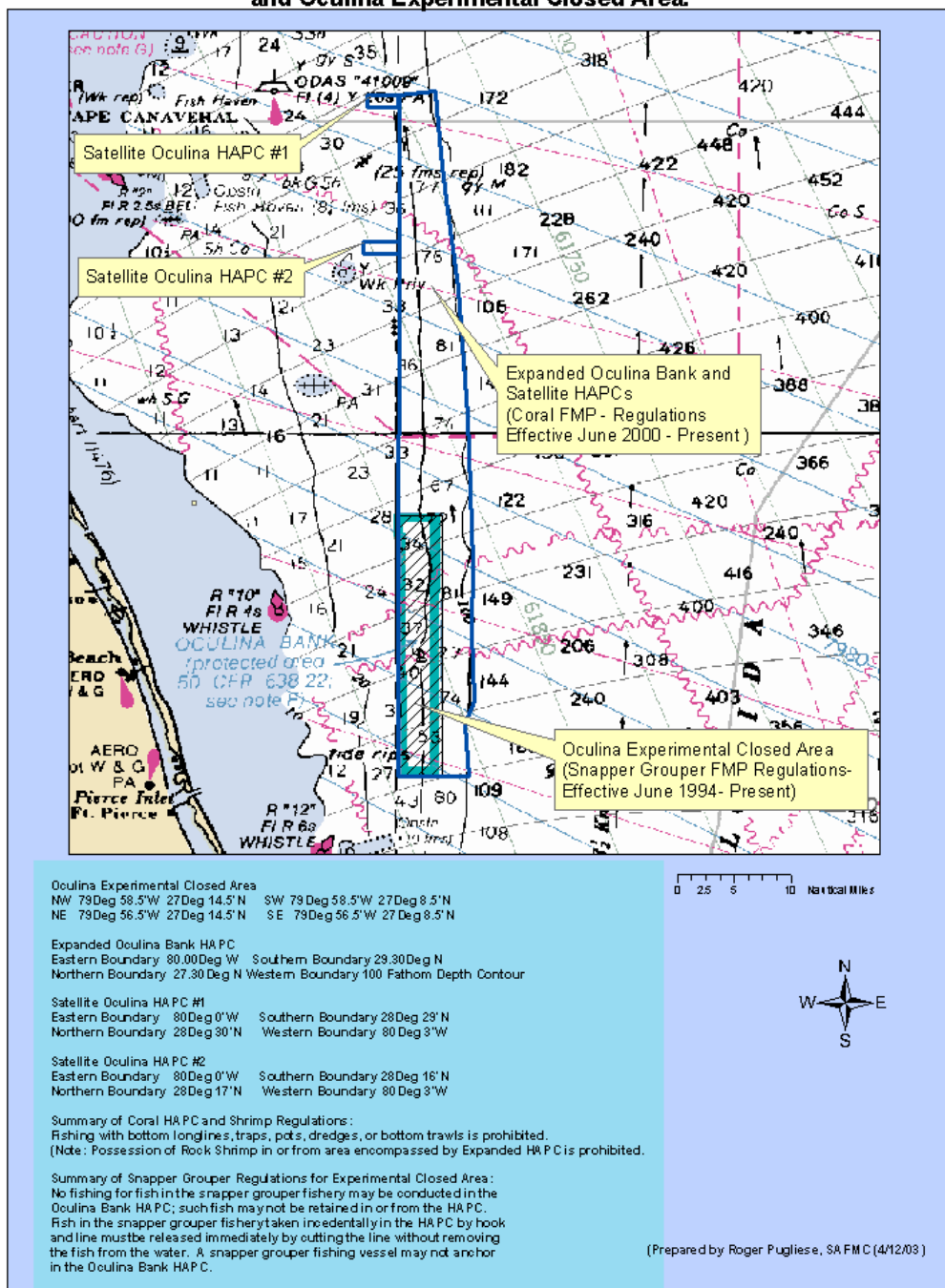


Figure 4. Expanded *Oculina* Bank HAPC, Satellite *Oculina* HAPCs, and the *Oculina* Experimental Closed Area.

1.2 Purpose and Need for Action

1.2.1 Purpose

The purpose of the proposed action is to provide continued protection of snapper grouper populations and associated *Oculina* coral.

1.2.2 Need for Action

The need for the proposed action is to provide a hedge against the high degree of scientific uncertainty associated with the status of snapper grouper species, reduce the possibility that these stocks may fall below sustainable levels and help rebuild stocks that are already below sustainable levels. In addition, the Council wants to provide the highest level of protection to the *Oculina* coral in this area by prohibiting the use of unregulated bottom fishing gear types that may impact *Oculina* coral.

Although stock assessments are a critical management tool for evaluating and monitoring the status and abundance of fish populations, they are usually associated with a level of scientific uncertainty. Sources of such uncertainty may include: 1) imperfections in catch statistics, 2) imprecise estimates of biological parameters, 3) variability in fishery independent resource surveys, and 4) natural variability in biological processes (NMFS 1999).

In the South Atlantic, such uncertainty was evident following the recent stock assessments of red porgy, black sea bass, vermilion snapper, and yellowtail snapper. Uncertainty was expressed through confidence intervals and numeric ranges of the biological reference points and status determination criteria that are used to guide management decisions. In fact, inadequate data led a panel of fisheries scientists to conclude that benchmarks for vermilion snapper estimated from the stock-recruitment relationship were unreliable and of no use to management (SAFMC's Scientific and Statistical Committee-Stock Assessment Sub-Committee Report 2003).

Fishery managers do not have recent assessments for sixty-nine snapper grouper species under Federal management in the South Atlantic region. According to a SEDAR planned assessment schedule, sixteen of these species will be assessed by May 2005. It is reasonable to infer that the uncertainty associated with assessments of the population size and status of these sixteen species will be larger than that associated with the assessments of red porgy, black sea bass, vermilion snapper, and yellowtail snapper due to greater data limitations.

No assessments are planned for the remaining fifty-three snapper grouper species. Fishery managers believe that the quantity and quality of the available population and catch data on these species may be insufficient to conduct a complete stock assessment. This belief is consistent with the conclusion of a recent national survey, which stated that the existing data and life history information on more than 60% of regulated fish stocks in Federal waters might be too sparse to provide useful assessments (NMFS 2001). The Council must use their informed judgment based on the best available scientific information (e.g., catch history, life history information, etc.) to determine the status of these data-poor snapper grouper species. As noted in Restrepo et. al. (1998), "in cases of severe data limitations, qualitative approaches (to determining stock status) may be necessary, including expert opinion and consensus-building methods". Due to the paucity of data, it will be difficult to derive precise and accurate estimates when determining status of these populations based on informed judgement.

Our lack of understanding of ecosystem processes and the fishery effects on these processes contributes to further scientific uncertainty associated with the status of these species. Marine ecosystem processes are complex and variable, limiting our ability to understand the ocean environment. Examples of missing ecological information include the indirect effects of fishing on non-target species, the effects of fishing on community structure of reef fish species, the effects of abiotic environmental factors on fisheries ecology, the relationships between predator and prey species, and the relationship between fish and habitat (NMFS 1999).

The importance of understanding ecological process in the regulation of fish populations is well noted (Link 2002; NMFS 1999). As an example, researchers have suggested that rising mean monthly bottom temperatures may help to explain the shift from a temperate to a more tropical fish community in the South Atlantic over the last 15 years (Parker and Dixon 1998). This illustrates the need to further understand the effects of changing climate patterns on species composition, community structure, and ecosystem function.

Fishery managers may account for the scientific uncertainty (both in environmental conditions and in our ability to assess the condition of fish stocks) by applying a precautionary approach in making management decisions. Marine Protected Areas (MPAs) have been identified as a tool to account for and mitigate the lack of scientific understanding of stock assessments and ecosystem-level processes (Bohnsack 1999; NMFS 2001). Because of the complex ecological and behavioral characteristics of snapper grouper species as well as the fishing pattern and behavior of participants in the snapper grouper fisheries, a spatial approach as a precautionary management tool is advantageous relative to more conventional management measures.

Targeted snapper grouper species often co-occur with non-targeted species, live in close association with bottom habitat such as *Oculina* coral, and aggregate to spawn (Gilmore and Jones 1992). As a result, fishing activity has the potential to cause bycatch mortality to non-targeted snapper groupers and other species, to damage habitat in which those species are captured, to disrupt reef fish community structure, and to deplete spawning aggregations. By providing a zone where some overall level of the biological resources are protected from removal or disturbance, MPAs avoid two unintended consequences of fishing: bycatch and habitat degradation from destructive fishing practices (Morgan and Chuenpagdee 2003).

In terms of the snapper grouper populations, MPAs have the potential to protect the genetic diversity, age structure, and sex ratio of snapper grouper populations by reducing the effects of fishery selection to a greater degree than is possible through conventional management measures (see PDT 1990; Bohnsack 1999; National Research Council 2001). In addition, MPAs have the potential to enhance fisheries in surrounding areas through the spillover of adults, juveniles, and larvae outside of a closed area (Murawski et. al. 2000; Roberts et. al. 2001). In fact, Amendment 14 to the Snapper Grouper Plan will propose a series of deepwater MPAs in the South Atlantic EEZ.

Despite the missing information, the intent and desire exists among fisheries scientists and managers to reduce the scientific uncertainty associated with our understanding of stock status and ecosystem-level interactions. At the national level, NOAA Fisheries outlined ways to improve the quality of its data collection and stock assessment programs through a Stock Assessment Improvement Plan (NMFS 2001). Regionally, the Southeast Fisheries Science Center completed a draft report outlining a strategy for the collection of fishery data

in order to improve stock assessments in the South Atlantic Region (SEFSC 2003). In an effort to better integrate ecosystem-based principles into management decisions, the Council has taken the first steps towards the development of a Fishery Ecosystem Plan (FEP) for the South Atlantic fisheries. Specific elements of the FEP will include delineation of ecosystem boundaries, food web modeling, ecosystem-level effects of fishing, increased socio-economic information, and calculation of total fishery removals. However, until these intents and desires can be developed into actual measures to improve our understanding of the fisheries, management decisions should operate under the precautionary mode, of which MPAs are an important component.

1.3 Scoping, Environmental Documentation, and Key Issues Associated with the Proposed Action

1.3.1 Scoping

Scoping is the procedure by which an agency identifies important issues and determines the extent of analyses necessary for an informed decision on a proposed action. A scoping meeting to determine the range of significant issues related to the proposed action to extend the prohibition of fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area was held March 5, 2001 in Jekyll Island, Georgia. A second scoping meeting on the proposed action was held March 3, 2002 in Savannah, Georgia.

Due to the degree of public meetings integrated into the fishery management process in the South Atlantic, scoping is an ongoing event that extends throughout the decision-making process. Concerns from the public are often discussed during the Council meeting deliberations, as reflected in the public record, and are then incorporated into the decision-making process. Comments the public provided on this amendment during the written comment period and during a public hearing held June 2003 in Cocoa Beach, Florida are summarized in Appendix A.

1.3.2 Environmental Documentation

The proposed action to extend the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area was originally combined with other actions to form Amendment 13/SEIS. A Notice of Intent (NOI) to prepare a SDEIS in association with Amendment 13 was published in the *Federal Register* on January 31, 2002 (67 FR 4696). The Council separated Amendment 13 into two amendments at its March 2003 meeting. The proposed action to extend the prohibition on fishing for and retention of snapper groupers species within the *Oculina* Experimental Closed Area is being evaluated in Amendment 13A to the Snapper Grouper FMP. The other actions originally contained in Amendment 13, including measures to bring the Snapper Grouper FMP into compliance with new requirements added to MSFCMA through the Sustainable Fisheries Act, will be evaluated in Amendment 13B. The purpose of this separation was to ensure that the Council addressed the prohibition on fishing for and retention of snapper grouper species in the *Oculina* Experimental Closed Area before it sunsets on June 27, 2004.

The preliminary environmental review of the proposed action in Amendment 13A indicated that it would not likely have a significant impact on the quality of the human environment. Consequently, the Council and NOAA Fisheries jointly prepared an Environment Assessment (EA) to make the determination of whether to prepare a

Supplemental EIS or a Finding Of No Significant Impact (FONSI). That EA, which is integrated in this amendment, resulted in a FONSI. The FONSI is contained in Section 9.0.

1.3.3 Key Issues

Significant issues associated with the proposed action have been identified below.

Biological Issues

- A hedge against the high degree of scientific uncertainty associated with the status of snapper grouper species that is provided by the *Oculina* Experimental Closed Area in relation to other management measures.
- The potential benefits provided by an area that is closed to fishing for the recovery of overfished snapper grouper species. Examples include increased egg and larval production, increased abundance of stocks inside reserves, and the exportation of juvenile and adults to fishing grounds.
- The protection to *Oculina* coral provided by eliminating the hook and line gear that could impact the bottom within the *Oculina* Experimental Closed Area.
- The opportunity to provide researchers with an area in the South Atlantic region to assess: 1) the effects of prohibiting harvest of snapper grouper species; 2) the characteristics of an unfished resource area that is protected from habitat damage; and 3) the recent coral restoration efforts through transplantation of *Oculina* fragments in an area where fishing for snapper grouper species is prohibited.

Socio-economic Issues

- The social and economic short-term and long-term impacts to fishermen (both positive and negative) expected from extending the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area.
- The lack of enforcement of the *Oculina* Experimental Closed Area as reported by fishermen and noted in the scientific literature (Koenig, 2001).

1.3.4 The Scope of Alternatives

The scope of the proposed action is to *extend the time period* of the *Oculina* Experimental Closed Area. Other alterations to the characteristics of the *Oculina* Experimental Closed Area, in terms of the size of the area and regulations governing the use of the area, were not considered appropriate for detailed study at this time when considered in the context of the purpose and need described in Section 1.2. Decreasing the size and utilizing other management measures would not provide a hedge against the high degree of scientific uncertainty associated with the status of snapper grouper species, in addition to not providing the highest level of protection to *Oculina* corals. The detailed discussions are contained in minutes of the Council's deliberations that are part of the administrative record.

Appendix A contains alternatives that were suggested, but eliminated from detailed study. Oral comments were received at the public hearing (June 16, 2003) and written comments received during the public comment period on the FMP Amendment

1.4 Management Objectives of the Snapper Grouper Fishery Management Plan

The Snapper Grouper FMP, as amended, contains 14 objectives:

1. Prevent overfishing.
2. Collect necessary data to develop, monitor, and assess biological, economic, and social impacts of management measures designed to prevent overfishing, and address the other stated problems.
3. Promote orderly utilization of the resource.
4. Provide for a flexible management system that minimizes regulatory delays while retaining substantial Council and public involvement in management decisions, and rapidly adapts to changes in resource abundance, new scientific information, and changes in fishing patterns among user groups.
5. Minimize habitat damage due to direct and indirect effects of recreational and commercial fishing activities as well as other non-fishery impacts.
6. Promote public comprehension of, voluntary compliance with, and enforcement of the management measures.
7. Mechanism to vest participants: A controlled access system provides a means whereby participants have a stake in conserving the resource. This ensures that participants consider the long-run benefits of conserving the resource because they know it is in their best interest. Unlike open access, controlled access would ensure that those who conserve the resource share in the long-run benefits. This gives fishermen incentive to protect the resource and expose those who are violating regulations. As a result, voluntary compliance would increase and enforcement costs would likely decrease.
8. Promote stability and facilitate long-run planning: Participants in the fishery will have access to the resource based on certain criteria to be determined by the Council after reviewing public comments. This would give participants the flexibility to employ the most profitable way to fish and also fish when it is most profitable in terms of market conditions. Such a system will promote stability in the fishery by providing a regular supply of fish throughout the fishing year, and maintain stable prices. Both fishermen and fish dealers will have the incentive to engage in long-run planning and investment activities.
9. Create market-driven harvest pace and increase product continuity: A system that ensures participants can harvest their allocations (whether in terms of individual quotas, effort units, trip limits, etc.) anytime during the fishing year would ensure that fishermen conduct their fishing activities to supply the market according to its structure and demand

situation. There would be no incentive on the part of fishermen to flood the market with fish. This could result in product continuity, improved product quality, and better prices.

10. Minimize gear and area conflicts among fishermen: Presently, allowable gear provision (implemented under Snapper Grouper Amendment 6) controls the types of gear in the fishery. Controlled access and effort unit controls would limit the number of allowable gear in the fishery.

11. Decrease incentives for overcapitalization: If some form of vested interest is provided to fishermen, their objective would be to maximize profits subject to certain conditions. In order to maximize profits they would explore the least cost method for harvesting in the fishery. This means they would employ fishing effort only to the point where the difference between the anticipated total revenue and total cost is greatest. This practice would reduce incentives for overcapitalization.

12. Prevent continual dissipation of returns from fishing through open access: It is a well known fact that under open access any measure(s) that generate “pure profits” will provide an opportunity for those already in the fishery to dissipate those profits and also attract new entrants into the fishery. This can only be prevented if measures are taken to prevent those already in the fishery from increasing their effort without any restriction and also to create a barrier against unlimited entry into the fishery. A controlled access system will reduce the incentive for present participants to violate the regulations, and also prevent unlimited entry into the fishery.

13. Evaluate and minimize localized depletion: High fishing mortality rates have resulted in localized depletion of some species in certain areas. Certain species are overfished throughout their range; however, there are particular areas where the overfishing rate is more severe than in the rest of the range. There may also be some cases where the stock as a whole is not overfished, but the numbers in a localized area have been significantly reduced.

14. Minimize bycatch: Reflects greater responsibility under recent Magnuson-Stevens Act amendment which added the following national standard.: “(9) Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.”

The preferred alternative to extend the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area could assist the Council in achieving objectives 1, 2, 5, 13, and 14. By protecting a portion of snapper grouper stocks from directed fishing mortality, the preferred alternative could assist in preventing overfishing (Objective 1) minimizing localized depletion (Objective 13) and bycatch (Objective 14) in the snapper grouper fishery. Protecting fragile *Oculina* coral from the potential impacts of hook and line gear used to target snapper grouper species would be consistent with the Council’s desire to minimize habitat damage (Objective 5). And, finally, the closed area also would provide fishery scientists the opportunity to gather data on the biological and ecological effects of fishing on fish and fish habitat (Objective 2).

1.5 History of Management

The **Fishery Management Plan/Environmental Impact Statement (FMP/EIS)** for the Snapper Grouper Fishery of the South Atlantic Region (SAFMC 1983) was prepared by the South Atlantic Fishery Management Council. The FMP was prepared to prevent growth overfishing in thirteen species in the snapper grouper complex and to establish a procedure for preventing overfishing in other species. The FMP established a 12" total length minimum size for red snapper, yellowtail snapper, red grouper and Nassau grouper; an 8" total minimum size for black sea bass; and a 4" trawl mesh size to achieve a 12" minimum size for vermilion snapper. Additional harvest and limitations on the use of certain gear, including poisons, explosives, fish traps, and trawls were also included in the original plan. The final rule implementing this FMP was published in the *Federal Register* on August 31, 1983 [48 FR 39463].

The Snapper Grouper FMP also contained a management measure that provided for designating modified habitats or artificial reefs as special management zones (SMZs). Through a **Regulatory Amendment to the Snapper Grouper FMP**, the Council prohibited fishing in these areas except with hand-held hook-and-line gear (including manual, electric, or hydraulic rod and reel) and spearfishing gear (including powerheads and spear guns). The harvest of Goliath grouper also was prohibited within these SMZs. The final rule implementing this regulatory amendment was published in the *Federal Register* on March 27, 1987 [52 FR 9864].

The Council prepared **Amendment 1/Environmental Assessment (EA)** (SAFMC 1988) to address habitat damage and growth overfishing in the trawl fishery. The amendment prohibited use of trawl gear to harvest fish in the directed snapper grouper fishery south of Cape Hatteras, North Carolina (35° 15 minutes N Latitude) and north of Cape Canaveral, Florida (Vehicle Assembly Building, 28° 35.1 minutes N Latitude). A vessel with trawl gear and more than 200 pounds of fish in the snapper grouper fishery (as listed in 50 C.F.R. Part 622, Appendix A Table 4) on board was defined as a directed fishery. The amendment also established a rebuttable presumption that a vessel with fish in the snapper grouper fishery (as listed in Section 646.2 of the regulations) on board harvested its catch of such fish in the Exclusive Economic Zone (EEZ). The final rule implementing this amendment was published in the *Federal Register* on January 17, 1989 [54 FR 1720].

Soon thereafter, the Council designated two artificial reefs off Ft. Pierce, Florida, as SMZs, in which specific fishing gear and harvest limitations applied. The final rule implementing this regulation was published in the *Federal Register* on February 28, 1989 [54 FR 8342].

On September 24, 1990, the Council published in the *Federal Register* a **Notice of Control Date** for entry into the wreckfish fishery. This notice was intended to inform the public that anyone entering the Federal wreckfish fishery off the South Atlantic states between 30° and 33°N latitude after March 28, 1990 would not be assured of future access to the fishery if a limited entry program was developed and implemented [56 FR 36052].

Two months later, the Council established an SMZ around an artificial reef at Key Biscayne, Florida. The Council prohibited fish trapping, bottom longlining, spear fishing, and harvesting of Goliath grouper within the SMZ. The final rule implementing this regulation was published in the *Federal Register* on October 3, 1990 [55 FR 40394].

Amendment 2/EA (SAFMC 1990a) prohibited the harvest or possession of Goliath grouper in or from the EEZ in the South Atlantic due to its overfished status and defined

overfishing for Goliath grouper and other snapper grouper species according to the National Marine Fisheries Service (NMFS) 602 guidelines requirement that definitions of overfishing be included for each fishery management plan. The regulations prohibiting harvest or possession of Goliath grouper were initially implemented through an **emergency rule**. The amendment was approved on October 10, 1990 and the final rule implementing Amendment 2 was published in the *Federal Register* on November 2, 1990 [55 FR 46213].

Amendment 3/EA (SAFMC 1990b) established a management program for the wreckfish fishery. The Council was concerned that the rapid increase in effort and catch threatened the wreckfish resource with overfishing and that the concentration of additional vessels in the relatively small area where the resource is located could also create problems with vessel safety because of overcrowding. Major actions in this amendment included, but were not limited to:

- (1) Adding wreckfish to the management unit;
- (2) Defining optimum yield and overfishing for wreckfish;
- (3) Requiring an annual permit to fish for, land or sell wreckfish;
- (4) Collecting data necessary for effective management;
- (5) Establishing a control date of March 28, 1990 after which there would be no guarantee of inclusion in a limited entry program should one be developed (this was later limited to the area bounded by 33° and 30° N. latitude based on public hearing testimony);
- (6) Establishing a fishing year beginning April 16;
- (7) Establishing a process whereby annual total allowable catch (annual quotas) would be specified, with the initial quota set at 2 million pounds;
- (8) establishing a 10,000 pound trip limit; and
- (9) establishing a spawning season closure from January 15 through April 15.

Actions (6), (8) and (9) were based on public testimony. An **emergency rule** effective August 3, 1990 [55 FR 32257] added wreckfish to the management unit, established a fishing year for wreckfish commencing April 16, 1990, established a commercial quota of 2 million pounds and established a catch limit of 10,000 pounds per trip. The Secretary of Commerce closed the fishery for wreckfish in the EEZ effective August 8, 1990 when the 2 million pound TAC was reached [55 FR 32635]. The Council requested an **extension of the emergency rule** which was approved [55 FR 40181]. Amendment 3 was approved on November 9, 1990 and the final rule implementing Amendment 3 was published in the *Federal Register* on January 23, 1991 [56 FR 2443].

On July 30, 1991, the Council published in the *Federal Register* a **Notice of Control Date** for entry into the snapper grouper fishery. This notice was intended to inform the public that anyone entering the Federal snapper grouper fishery, other than the wreckfish fishery, after July 30, 1991 would not be assured of future access to the fishery if a limited entry program was developed and implemented [56 FR 36052].

Amendment 4/EA (SAFMC 1991a) was prepared to reduce fishing mortality on overfished species, to establish compatible regulations, where possible, between state and federal agencies, to identify the universe of fishermen, and to gather the data necessary for management. Amendment 4 established prohibitions on:

- (1) The use of fish traps in the South Atlantic EEZ with the exception of black sea bass pots when used north of Cape Canaveral, Florida. Permit, gear, and vessel identification requirements were specified for black sea bass pots;
- (2) The use of entanglement nets, which includes gill and trammel nets;
- (3) The use of longline gear inside 50 fathoms (300 feet) in the snapper grouper fishery in the South Atlantic EEZ;
- (4) The use of bottom longlines to harvest wreckfish; and
- (5) The use of powerheads and bangsticks in all designated special management zones (SMZs) off the South Carolina coast.

In addition, fishermen who fish for other species with gear prohibited in the snapper grouper fishery may not have a bycatch of snapper and grouper species in excess of the allowed bag limit. No bycatch would be allowed for those species that have no bag limit or that are prohibited.

The amendment also established the following minimum sizes with a requirement that all snappers and groupers possessed in the South Atlantic EEZ have head and fins intact through landing:

- (1) 8" total length for lane snapper and black sea bass;
- (2) 10" total length for vermilion snapper (recreational fishery only);
- (3) 12" total length for red porgy, vermilion snapper (commercial fishery only), gray, yellowtail, mutton, schoolmaster, queen, blackfin, cubera, dog, mahogany and silk snappers;
- (4) 20" total length for red snapper, gag, and red, black, scamp, yellowfin, and yellowmouth groupers;
- (5) 28" fork length for greater amberjack (recreational fishery only); and
- (6) 36" fork length or 28" core length for greater amberjack (commercial fishery only).

Amendment 4 established the following bag limits:

- (1) 10 vermilion snapper per person per day;
- (2) 3 greater amberjack per person per day;
- (3) An aggregate snapper bag limit of 10 fish per person per day, excluding vermilion snapper and allowing no more than two red snappers; and
- (4) An aggregate grouper bag limit of five per person per day, excluding Nassau grouper and Goliath grouper for which no retention is allowed.

Charter and head boats are allowed to have up to a two-day possession limit as long as there are two licensed operators on board and passengers have receipts for trips in excess of 12 hours. Excursion boats would be allowed to have up to a three-day possession limit on

multi-day trips. Fish harvested under the bag limit may be sold in conformance with state laws if they meet the commercial minimum sizes.

Amendment 4 also established two spawning season closures:

- (1) The commercial harvest and/or landing of greater amberjack in excess of the three-fish bag limit is prohibited in April south of Cape Canaveral, Florida; and
- (2) The commercial harvest and/or landing of mutton snapper in excess of the snapper aggregate bag limit is prohibited during May and June.

Amendment 4 included the following commercial regulations:

- (1) To exceed bag limits in the snapper grouper fishery, an owner or operator of a vessel that fishes in South Atlantic federal waters is required to obtain an annual vessel permit;
- (2) For individuals to qualify for a permit they must have at least 50% of their earned income, or \$20,000 in gross sales, derived from commercial, charter, or headboat fishing;
- (3) For a corporation to be eligible for a permit, the corporation or shareholder or officer of the corporation or the vessel operator would be required to have at least \$20,000 in gross sales derived from commercial fishing;
- (4) For partnerships, the general partner or operator of the vessel is required to meet the same qualifications as a corporation; and
- (5) A permit, gear, and vessel and trap identifications are required to fish with black sea bass pots.

Amendment 4 also addresses enforcement concerns that surfaced with the wreckfish trip limit. Bottom longline gear was being used to a limited extent in the wreckfish fishery and fishermen indicated that gear loss, habitat damage and lost gear continuing to fish were problems. The Council subsequently requested and was granted **emergency regulations** [56 FR 18742] that prohibited the use of bottom longline gear in the wreckfish fishery effective April 19, 1991 and were granted an **extension** on July 19, 1991 [56 FR 33210].

Amendment 4 was approved on August 26, 1991 by the Secretary of Commerce and all regulations were effective on January 1, 1992 except the bottom longline prohibition for wreckfish was implemented on October 25, 1991. The final rule was published in the *Federal Register* on October 31, 1991 [56 FR 56016].

The Council prepared **Amendment 5/EA** (SAFMC 1991b) to establish an Individual Transferable Quota (ITQ) management program for the wreckfish fishery. The amendment included the following:

- (1) A limited entry program for the wreckfish sector of the snapper grouper fishery consisting of transferable percentage shares of the annual total allowable catch (TAC) of wreckfish and individual transferable quotas (ITQs) based on a person's share of each TAC;
- (2) Required dealer permits to receive wreckfish;
- (3) Removed the 10,000-pound (4,536-kilogram) trip limit for wreckfish;
- (4) Required that wreckfish be off loaded from fishing vessels only between 8:00 a.m. and 5:00 p.m.;
- (5) Reduced the occasions when 24-hour advance notice must be made to NMFS Law Enforcement for off-loading of wreckfish; and
- (6) Specified the procedure for initial distribution of percentage shares of the wreckfish TAC.

The Council submitted the amendment to the Secretary of Commerce on September 12, 1991. The final rule implementing this amendment was published in the *Federal Register* on March 5, 1992 [57 FR 7886]. Amendment 5 was implemented with an effective date of April 6, 1992, except that the sections dealing with permits and fees, falsifying information, and percentage shares was effective March 5, 1992 [57 FR 7886].

Implementation of Amendment 4 resulted in a prohibition on black sea bass pot fishermen making multi-gear trips and retaining other species that resulted in large, unintended economic losses. The Council subsequently requested **emergency regulations** on July 8, 1992 to modify the definition of black sea bass pot, allow multi-gear trips, and allow retention of incidentally caught fish. These regulations became effective on August 31, 1992 [57 FR 39365] and were extended on November 30, 1992 [57 FR 56522]. On December 11, 1992 the Council submitted a **regulatory amendment** implementing the above changes on a permanent basis. An interim final rule and request for comments was published in the *Federal Register* on March 2, 1993 with an effective date of March 1, 1993 [58 FR 11979]. The final rule was published in the *Federal Register* on July 6, 1993 [58 FR 36155] with an effective date of July 6, 1993.

The Council submitted a **regulatory amendment** requesting implementation of eight special management zones off South Carolina on August 12, 1992. The amendment restricted fishing in these SMZs to hand-held, hook-and-line gear (including manual, electric, or hydraulic rod and reel) and spearfishing (excluding powerheads). The proposed rule was published in the *Federal Register* on March 15, 1993 [58 FR 13732]. The final rule was published in the *Federal Register* on July 2, 1993 [58 FR 35895] with the effective date of July 31, 1993.

The Council prepared **Amendment 6/EA** (SAFMC 1993) to rebuild the snowy grouper, golden tilefish, speckled hind, Warsaw grouper, misty grouper, and yellowedge grouper resources. Amendment 6 contained a number of management measures, including, but not limited to:

- (1) Catch quotas (to be phased in over a three-year period beginning January 1994);
- (2) Commercial trip limits;
- (3) Recreational bag limits; and
- (4) Creation of the *Oculina* Experimental Closed Area, within which fishing for and retention of snapper grouper species was prohibited.

Data were specified to be collected to evaluate shifts in fishing effort (effort shifts) among fisheries and for future evaluation of an “Individual Transferable Quota” (ITQ) type of management approach. Amendment 6 was submitted to the Secretary of Commerce in December 1993 and was approved on May 5, 1994 with the exception of the 100% logbook coverage and the anchoring prohibition within the *Oculina* Bank. The final rule was published in the *Federal Register* on May 26, 1994 [59 FR 27242]. Commercial trip limits for snowy grouper and golden tilefish became effective June 6, 1994, and the remainder of the regulations became effective June 27, 1994.

The **Secretary** initially required 25% logbook coverage; this was later increased to 100% coverage upon renewal of permits (established through Amendment 6) on the permit holders birth date.

The Council prepared **Amendment 7/EA** (SAFMC 1994a) to provide additional protection to snapper grouper species. The amendment specified a number of actions including, but not limited to, the following:

- (1) Established a 12" fork length size limit for hogfish;
- (2) Increased the mutton snapper size limit from 12" to 16" total length;
- (3) Required dealer, charter and headboat federal permits;
- (4) Allowed sale under specified conditions;
- (5) Specified allowable gear and made allowance for experimental gear [Note: allowable gear includes vertical hook & line gear, spearfishing without rebreathers except that explosive charges including powerheads are not allowed in the EEZ off SC, bottom longlines deeper than 50 fathoms only north of St. Lucie Inlet, Florida, and for species other than wreckfish, and black sea bass pots except where expressly prohibited.];
- (6) Made allowance for multi-gear trips in North Carolina;
- (7) Added localized overfishing to the list of problems and objectives;
- (8) Adjusted the bag limit and crew specification for charter and headboats;
- (9) Modified the management unit for scup to apply south of Cape Hatteras, North Carolina; and
- (10) Modified the framework procedure to increase the timeliness of action by the Council.

Amendment 7 was submitted to the Secretary of Commerce on June 16, 1994. The final rule was published in the *Federal Register* on December 23, 1994 [59 FR 66270] and the regulations became effective January 23, 1995 except for application and possession of dealer, charter and headboat federal permits which became effective December 23, 1994 and March 1, 1995 respectively.

At the request of the State of Florida, the Council prepared and submitted **Regulatory Amendment 6** (SAFMC 1994b) to increase protections for select snapper grouper species and to enhance enforcement by having the same regulations in State and Federal waters. Regulatory Amendment 6 included the following:

- (1) Established a daily recreational bag limit of 5 hogfish per person;
- (2) Limited the harvest and possession of cubera snapper measuring 30" total length or larger to 2/day; and
- (3) Established a minimum size limit for gray triggerfish of 12" total length.

These measures applied only in the EEZ off the Atlantic coast of Florida. The regulatory amendment was sent to the Secretary of Commerce on October 21, 1994. The proposed rule was published in the *Federal Register* on February 15, 1995 [60 FR 8622]. The final rule was published in the *Federal Register* on April 20, 1995 [60 FR 19683] with effective date of May 22, 1995.

In a letter dated February 6, 1997, the Council requested establishment of **a control date for the black sea bass pot fishery** effective upon publication in the *Federal Register*. The **Advanced Notice of Proposed Rulemaking** was published in the *Federal Register* on April 23, 1997 [62 FR 19732], which established April 23, 1997 as the control date for the black sea bass pot fishery. The intent of this notice was to inform the public that anyone entering the black sea bass pot fishery after the control date would not be assured of future participation in the fishery if a limited entry program were to be developed and implemented.

1.0 Introduction

The Council prepared **Amendment 8/SEIS** (SAFMC 1997) to limit effort in the snapper grouper fishery. The amendment accomplished the following:

- (1) Established a program to limit initial eligibility for participation in the snapper grouper fishery to owners of boats/vessels that: (a) can demonstrate any landings of species in the snapper grouper management unit in 1993, 1994, 1995 or 1996 (as of August 20, 1996) and (b) held a valid snapper grouper permit between February 11, 1996 and February 11, 1997;
- (2) Vessels that landed at least 1,000 pounds of species in the snapper grouper management unit in any of these years received a transferable permit;
- (3) All other vessels received a non-transferable permit and were limited to a 225-pound trip limit;
- (4) Modified the problems, objectives, Optimum Yield, and overfishing definition in the snapper grouper management plan;
- (5) Expanded the Council's habitat responsibility;
- (6) Modified allowable gear which allowed the retention of snapper grouper species in excess of the bag limits on a permitted vessel that has a single bait net or cast nets on board; and
- (7) Included a measure that, subject to specific conditions, permitted vessels to possess on board fillets of fishes that were harvested in the Bahamas.

Amendment 8 was submitted to the Secretary of Commerce on July 10, 1997. The notice of availability of Amendment 8 was published in the *Federal Register* on October 30, 1997 [62 FR 58703] thereby beginning the formal review process. On January 28, 1998 the Secretary of Commerce approved all measures in the amendment, with the exception of the overfishing and overfished definitions (including the 10% threshold level). The proposed rule was published in the *Federal Register* on January 12, 1998 [63 FR 1813]. The final rule was published in the *Federal Register* on July 16, 1998 [63 FR 38298]. Amendment 8 became fully effective in December 1998.

The Council prepared **Amendment 9/SEIS** (SAFMC 1998a) to provide additional protection to snapper grouper species based on the 1994 stock assessment prepared by the Southeast Fisheries Science Center.

Amendment 9 included measures that:

- (1) Increased the **red porgy** minimum size limit from 12" TL to 14" TL for both recreational and commercial fishermen, established a recreational bag limit of 5 red porgy per person per day, prohibited harvest and possession in excess of the bag limit during March and April, and prohibited purchase and sale during March and April;
- (2) Increased the **black sea bass** minimum size limit from 8" TL to 10" TL for both recreational and commercial fishermen, and established a recreational bag limit of 20 black sea bass per person per day;
- (3) **Required escape vents and escape panels** with degradable fasteners in black sea bass pots;
- (4) Established measures for **greater amberjack** that: reduced the recreational bag limit from 3 to 1 greater amberjack per person per day, prohibited harvest and possession in excess of the bag limit during April throughout the EEZ, established a quota at 63% of 1995 landings (quota=1,169,931 pounds), began the fishing year on May 1, prohibited sale of fish harvested under the bag limit when the season was closed, and prohibited coring;

(5) Increased the recreational **vermillion snapper** minimum size limit from 10" to 11" TL and retained the current 10-fish bag limit;

(6) Increased the **gag grouper** minimum size limit from 20" TL to 24" TL for both recreational and commercial fishermen, prohibited harvest and possession in excess of the bag limit during March and April, and prohibited purchase and sale during March and April;

(7) Increased the **black grouper** minimum size limit from 20" to 24" TL for both recreational and commercial fishermen, prohibited harvest and possession in excess of the bag limit during March and April, and prohibited purchase and sale during March and April;

(8) Specified that within the **5-fish aggregate grouper bag limit** (which at the time included tilefish and excluded Goliath grouper and Nassau grouper), no more than 2 fish may be gag grouper or black grouper (individually or in combination);

(9) Established an **aggregate recreational bag limit** of 20 fish per person per day inclusive of all snapper grouper species currently not under a bag limit, excluding tomtate and blue runners (there would be no bag limit on tomtate and blue runners); and

(10) Specified that **vessels with longline gear** aboard may only possess snowy grouper, Warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish.

Recognizing the need for measures contained in Amendment 9, particularly for red porgy, the Council requested implementation of Amendment 9 (except the black sea bass pot construction measure) as an **Interim Request under the Magnuson-Stevens Act** on January 16, 1998. Amendment 9 was finalized and sent to the Secretary of Commerce for formal review and implementation on February 3, 1998. On May 14, 1998 the National Marine Fisheries Service informed the Council that they **suspended action on the interim rule** and that they intended, instead, to address these measures under Amendment 9.

The notice of availability of Amendment 9 was published in the *Federal Register* on September 8, 1998 [63 FR 47461] thereby beginning the formal review process. On September 24, 1998 the Council requested that all measures in Amendment 9 be implemented through **emergency action**. Once again, the Council was attempting to begin rebuilding of overfished species, particularly red porgy, as soon as possible. The proposed rule was published in the *Federal Register* on November 12, 1998 [63 FR 63276]. The Secretary of Commerce partially approved Amendment 9 on December 9, 1998; all measures were approved except the 1,000-pound trip limit for greater amberjack. On January 22, 1999 the National Marine Fisheries Service informed the Council that the final rule for Amendment 9 was to be filed with the Office of the *Federal Register* on January 21, 1999, with an effective date of February 24, 1999. The final rule was published in the *Federal Register* on January 25, 1999 [64 FR 3624]. Amendment 9 became effective February 24, 1999.

Thus regulations addressing red porgy, based on the 1994 stock assessment using data through 1992, took effect on February 24, 1999, a full year after the Council submitted the document to the Secretary of Commerce. Neither the Council's interim rule or emergency rule requests were approved.

During their March 1999 meeting, the Council received a new red porgy stock assessment prepared by the Southeast Fisheries Science Center which consisted of a complete virtual population analysis (VPA) and included data through 1996 for VPA

analyses and through 1997 for other analyses (Vaughan 1999). The spawning potential ratio (SPR) was determined to be 24%.

The level of information available for red porgy also allowed for examination of the biomass and recruitment levels. The assessment report concluded that biomass had decreased from an annual estimate of 9,913 metric tons during the time period 1972-78, to 3,557 metric tons during 1982-86, and to 685 metric tons during 1992-96. This represented a 93% reduction from 1972-78 to 1992-96. Over the same time periods, recruitment (the number of age 1 fish entering the population) declined from 6.53 million fish per year (1972-78), to 2.38 million fish per year (1982-86), and to 0.66 million fish per year (1992-96). This represented a 90% reduction from 1972-78 to 1992-96.

Even though red porgy regulations contained in Amendment 9 were implemented on February 24, 1999, based on new Sustainable Fisheries Act requirements, the Council was required to request a prohibition on harvest and possession of red porgy be implemented through **emergency action**. The request was sent to the Secretary on April 6, 1999, was approved, published in the *Federal Register* on September 3, 1999 [64 FR 48324], and was effective September 8, 1999 through March 1, 2000. At the December 1999 meeting, the Council requested the **emergency rule be extended**. The extension, through August 28, 2000, was approved on February 25, 2000 [65 FR 10039].

On July 13, 1999 the Council requested the Snapper Grouper Amendment 8 application process be reopened through **emergency action**. The request was approved effective September 3, 1999 [64 FR 48326].

Amendment 10/EIS (SAFMC 1998b), which addressed the Habitat requirement of the Magnuson-Stevens Act, as amended in 1996, contained the following snapper grouper items [Note: Detailed information is presented in the Council's Habitat Plan (SAFMC 1998b)]:

1. Identify Essential Fish Habitat for Species in the Snapper Grouper Management Unit

Essential fish habitat for snapper grouper species includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet (but to at least 2000 feet for wreckfish) where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for larval survival and growth up to and including settlement. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse snapper grouper larvae.

For specific life stages of estuarine dependent and nearshore snapper grouper species, essential fish habitat includes areas inshore of the 100-foot contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom.

Refer to Section 3.0 in the Habitat Plan (SAFMC 1998c) for a more detailed description of habitat utilized by the managed species. Also, it should be noted that the Gulf Stream occurs within the EEZ.

2. Establish Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) for Species in the Snapper Grouper Management Unit

Areas which meet the criteria for essential fish habitat-habitat areas of particular concern (EFH-HAPCs) for species in the snapper grouper management unit include medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; nearshore hard bottom areas; The Point, The Ten Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump (South Carolina); mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper grouper (e.g., Primary and Secondary Nursery Areas designated in North Carolina); pelagic and benthic *Sargassum*; Hoyt Hills for wreckfish; the *Oculina* Bank Habitat Area of Particular Concern; all hermatypic coral habitats and reefs; manganese outcroppings on the Blake Plateau; and Council-designated Artificial Reef Special Management Zones (SMZs).

The Council's Comprehensive Habitat Amendment, which includes Amendment 10, was sent to the Secretary of Commerce for formal review on October 9, 1998. The notice of availability for Amendment 10 was published in the *Federal Register* on March 5, 1999. Amendment 10 was approved on June 3, 1999. The proposed rule was published on July 9, 1999 and a NMFS Supplement to the Proposed Rule was published on November 2, 1999. The final rule implementing this amendment was published in the *Federal Register* on June 14, 2000 [65 FR 37292] and regulations were effective July 14, 2000.

Amendment 11 (SAFMC 1998d), which addressed the non-habitat requirements of the Magnuson-Stevens Act, as amended in 1996, contained the following snapper grouper items:

(1) Maximum sustainable yield for species in the snapper grouper management unit is unknown. The Council reviewed alternatives and concluded the best available data supports using 40% Static SPR as a proxy for MSY for Goliath grouper and Nassau grouper, and 30% Static SPR as a MSY proxy for the remaining species.

(2) Optimum Yield (OY) for the snapper grouper fishery is the amount of harvest that can be taken by U.S. fishermen while maintaining the Spawning Potential Ratio (SPR) at or above 40% Static SPR for all species in the snapper grouper management unit except the following:

A. Hermaphroditic groupers (that is, those that switch sex, generally from females to males as they grow older) will be managed for an OY of 45% Static SPR.

B. Goliath grouper and Nassau Grouper will be managed for an OY of 50% Static SPR.

(3) Overfishing Level to meet Magnuson-Stevens Mandate:

A. Overfishing for all species in the snapper grouper management unit, except for Goliath grouper and Nassau grouper, is defined as a fishing mortality rate (F) in excess of the fishing mortality rate at 30% Static SPR (F30%Static SPR) which is the snapper grouper MSY proxy.

B. Overfishing for Goliath grouper and Nassau grouper is defined as a fishing mortality rate (F) in excess of the fishing mortality rate at 40% Static SPR (F40% Static SPR) which is the MSY proxy for Goliath grouper and Nassau grouper.

C. Overfishing for black sea bass is defined in terms of the Checklist (Appendix D) and information provided by Dr. Doug Vaughan, NMFS Beaufort Lab (Table 50). The two components of the status determination criteria are:

- (i) A maximum fishing mortality threshold (MFMT) — A fishing mortality rate (F) in excess of F30% Static SPR which is 0.72 (Table 50).
- (ii) A minimum stock size threshold (MSST) — The minimum stock size threshold is 3.72 million pounds (Table 50).

D. The “threshold level” for all species in the snapper grouper management unit, except for Goliath grouper and Nassau grouper, is defined as 10% Static SPR. For Goliath grouper and Nassau grouper, the “threshold level” is defined as 30% Static SPR. **Note: The “threshold level” was not approved.**

(4) Rebuilding Timeframe. Rebuilding projections are not available at this time. The Council recommends that projections be incorporated into the next stock assessment to the extent practicable to determine whether the overfished snapper grouper species can be rebuilt in less than 10 years. Until such time as this information is provided to the Council, the current timeframe for recovery remains in effect: The timeframe for recovery of snappers (excluding red snapper), greater amberjack, black sea bass, and red porgy is not to exceed 10 years. For red snapper and the groupers, the timeframe is not to exceed 15 years. Year 1 was the 1991 fishing year.

(5) Overfishing Evaluation to meet the Current Definition. The Council made the determinations shown for each species based on having Snapper Grouper Amendment 8 and Snapper Grouper Amendment 9 in place. The Council is in a difficult situation, particularly for species in the snapper grouper management unit, because these two major amendments have not been implemented and previous amendments have not been incorporated into assessment results for some species. [Note: Amendment 8 was implemented in December 1998 and Amendment 9 was implemented on February 24, 1999.] The Council’s previous actions will have major impacts on rebuilding overfished species. The Council’s conclusions reflect the belief that regulations already approved should be implemented and evaluated before determinations can be made whether additional regulations are required. The Council will continue to monitor the snapper grouper fishery and will use the framework procedure to implement any additional species specific measures as may be necessary following updated stock assessments received through the SAFE process described earlier.

The Council’s evaluations were as follows:

A. **Black sea bass** remain overfished. Black sea bass are above the “threshold level” with a static SPR of 26%. Black sea bass are overfished given that the MSST is 3.72 million pounds and the 1995 biomass was estimated to be 1.33 million pounds. Black sea bass are also experiencing overfishing given that the MFMT is 0.72 and the average fishing mortality rate (F) for 1991-1995 was 0.95. The measures proposed in Snapper Grouper Amendment 9 will reduce commercial catch by 26%, recreational catch by 36%, and total catch by 30%. The Council concluded these reductions are sufficient to rebuild black sea bass above the overfished level.

B. **Vermilion snapper** remain overfished with a static SPR of 21% to 27%. The measures proposed in Snapper Grouper Amendment 9 will reduce headboat catch by 29%, MRFSS catch by 70%, and total catch by 13%. The Council concluded these reductions are sufficient to rebuild vermilion snapper above the overfished level.

C. **Red porgy** remain overfished with a static SPR of 14% to 19%. The measures proposed in Snapper Grouper Amendment 9 will reduce commercial catch by 65%, recreational catch by 50%, and total catch by 59%. The Council concluded these reductions are sufficient to rebuild red porgy above the overfished level.

D. **Red snapper** remain overfished with a static SPR of 24% to 32%. The measures proposed through Snapper Grouper Amendment 7 will result in a projected SPR of 35%. The Council concluded these reductions and the measures contained in Snapper Grouper Amendments 8 and 9 are sufficient to rebuild red snapper above the overfished level.

D. **Gag** remain overfished with a static SPR of 27%. The measures proposed in Snapper Grouper Amendment 9 will reduce commercial catch by 37%, recreational catch by 13%, and total catch by 27%. The Council concluded these reductions are sufficient to rebuild gag above the overfished level.

F. **Scamp** are no longer overfished with a static SPR of 35%. The measures proposed in Snapper Grouper Amendment 9 will provide some additional protection. The Council concluded no additional measures are necessary to maintain scamp above the overfished level.

G. **Speckled hind** remain overfished with a static SPR of 8% to 13%. The measures proposed through Snapper Grouper Amendment 7 include a limit of 1 fish per vessel per trip, no sale, and establishment of the experimental closed area. Measures in Amendment 8 and 9 may provide some additional protection. The Council concluded these reductions are sufficient to rebuild speckled hind above the overfished level.

H. **Warsaw grouper** remain overfished with a static SPR of 6% to 14%. The measures proposed through Snapper Grouper Amendment 7 include a limit of 1 fish per vessel per trip, no sale, and establishment of the experimental closed area. Measures in Amendment 8 and 9 may provide some additional protection. The Council concluded these reductions are sufficient to rebuild Warsaw grouper above the overfished level.

I. **Snowy grouper** remain overfished with a static SPR of 5% to 15%. The measures proposed through Snapper Grouper Amendment 7 include a quota, trip limit, bag limit, and establishment of the experimental closed area. Measures in Amendment 8 and 9 may provide some additional protection. The Council concluded these reductions are sufficient to rebuild snowy grouper above the overfished level.

J. **Golden tilefish** remain overfished but the Assessment Group concluded there was inadequate information to update the existing SPR of 21%. The measures proposed through Snapper Grouper Amendment 7 include a quota, trip limit, bag limit, and establishment of the experimental closed area. Measures in Amendment 8 and 9 may provide some additional protection. The Council concluded these reductions are sufficient to rebuild golden tilefish above the overfished level.

K. **Nassau grouper** remain overfished but there is insufficient information to calculate a SPR. The measures proposed through Snapper Grouper Amendment 7 allow no retention and establishment of the experimental closed area. The Council concluded no further action is required for Nassau grouper at this time. This position is supported by the letter from NMFS (Appendix F in Snapper Grouper Amendment 11).

L. **Goliath grouper** remain overfished but there is insufficient information to calculate a SPR. The measures proposed through Snapper Grouper Amendment 7 allow no retention and establishment of the experimental closed area. The Council concluded no further action is required for Goliath grouper at this time. This position is supported by the letter from NMFS (Appendix F in Snapper Grouper Amendment 11).

M. **White grunt** are no longer overfished with a static SPR of 29% to 39%. The measures proposed in Snapper Grouper Amendments 8 and 9 will provide some additional protection. The Council concluded no additional measures are necessary to maintain white grunt above the overfished level.

The Council's SFA Comprehensive Amendment, which included Amendment 11, was submitted for formal review by the Secretary of Commerce on October 7, 1998. The notice of availability for Amendment 11 was published in the *Federal Register* on February 18, 1999. The SFA Comprehensive Amendment, including Amendment 11, was partially approved on May 19, 1999. The Secretary of Commerce partially approved the stock status determination criteria, and approved 10-year rebuilding schedules proposed by the Council for snappers other than red snapper, greater amberjack, black sea bass, and red porgy. The proposed rule was published on May 24, 1999. The final rule implementing Amendment 11 was published in the *Federal Register* on November 2, 1999 [64 FR 59126]. The Council is currently addressing measures that were disapproved in Amendment 11 in Amendment 13B to the Snapper Grouper FMP.

The Council prepared **Amendment 12/SEIS** (SAFMC 2000) to develop permanent measures to rebuild red porgy based on the 1999 biomass-based assessment. Measures included the following:

- (1) Established a MSY of 4.38 million pounds;
- (2) Established an OY equal to the amount of harvest that can be taken by U.S. fishermen while maintaining the SPR at or above 45% Static SPR;
- (3) Specified overfishing (maximum fishing mortality threshold/MFMT) and overfished (minimum stock size threshold/MSST) parameters as MFMT = 0.43, MSST = 7.34 million pounds, and a rebuilding timeframe of 18 years with 1999 being year 1;
- (4) Reduced the bag limit from 5 to 1;
- (5) Specified that during January through April no sale is allowed and everyone is limited to 1 fish;
- (6) Continued the 14-inch minimum size limit;
- (7) Established a 50-pound bycatch trip limit for commercial vessels from May through December;
- (8) Modified the list of management options and actions that could be implemented as framework measures; and
- (9) Modified the limited access system to allow same owner permit transfers regardless of vessel size for 225-pound trip limit permit holders participating in the snapper grouper limited access program.

Amendment 12 was submitted for formal review by the Secretary of Commerce on March 15, 2000. The notice of availability for Amendment 12 was published in the *Federal Register* on April 19, 2000. The proposed rule was published in the *Federal Register* on June 6, 2000, and the amendment was approved on July 19, 2000. The final rule implementing this amendment was published in the *Federal Register* on August 23, 2000 [65 FR 51248] with the regulations effective on August 29, 2000 except the transfer of 225-pound permits which became effective on September 22, 2000.

Amendment 13A/EA would extend the regulation prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area.

As noted in Section 1.3.2, the Council is developing **Amendment 13B/EIS** to address measures that were disapproved in Amendment 11. Specifically, measures in Amendment 13B will:

- (1) Redefine as needed, based on FMP objectives, the fishery management units (FMUs) and sub-units that reflect those stocks of fish that are best managed individually and those stocks of fish that are interrelated and best managed as a unit or in close coordination;
- (2) Define biomass-based estimated of biological reference points and status determination criteria for all stocks/complexes that comprise the FMU, consistent with the MSFCMA requirements to assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, fisheries and to specify objective and measurable criteria for identifying when a fishery is overfished;
- (3) Establish rebuilding schedules based on biomass-based estimates of status determination criteria for all overfished stocks/complexes in the FMU, consistent with the requirements of the MSFCMA;
- (4) Establish control rules, and implement management measures, as needed, to end overfishing and rebuild overfished stocks, and prevent overfishing in fisheries that are identified as approaching an overfished condition, consistent with the requirements of the MSFCMA;
- (5) Review the implementation of the logbook/Atlantic Coastal Cooperative Statistics Program (ACCSP), bycatch reporting program in the context of its consistency with the MSFCMA requirements to establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery; and
- (6) Assess the practicability for additional bycatch reduction measures, consistent with the MSFCMA requirement to minimize, to the extent practicable, bycatch and bycatch mortality.

Amendment 14/EIS, also under development, will establish Marine Protected Areas (MPAs) off the coasts of North Carolina, South Carolina, Georgia, and the East Coast of Florida. These MPAs are being developed with extensive public input through scoping meetings, informal meetings, workshops, and two rounds of public hearings. The Council is considering these MPAs to assist in rebuilding the stock status of and preserving the age/size structure of deepwater snappers and groupers. In addition, Amendment 14 will establish rebuilding schedules using biomass-based estimates of status determination criteria for all overfished deepwater species in the FMU; establish control rules, and implement additional management measures, as needed, to end overfishing and rebuild overfished deepwater species in the FMU, and prevent overfishing in deepwater fisheries that are identified as approaching an overfished condition, consistent with the requirements of the MSFCMA.

2.0 **ALTERNATIVES INCLUDING THE PROPOSED ACTION**

This Environmental Assessment explores the differences among a number of alternatives related to extending the regulation prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area. Alternatives are developed to show ways of meeting the purpose and need while addressing a range of issues. For Amendment 13A to the Snapper Grouper Fishery Management Plan, alternatives were received and developed through interdisciplinary team meetings, Council meetings, written public comments, scoping meetings, and a public hearing. After a review and analysis, six alternatives were finalized for detailed investigation. Alternatives 2, 3, and 4 would specify that the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area sunset after 10, 20 or 50 years, respectively. Alternatives 1 and 5 would extend the regulations indefinitely. Alternative 1 would require the Council to review the size and the configuration of the *Oculina* Experimental Closed Area within three years of the publication date of the final rule implementing this amendment. In addition, Alternative 1 would require the Council to re-evaluate the regulations after a ten-year period.

The Council decided to consolidate the requirements of the Magnuson-Stevens Act, Regulatory Flexibility Act, NEPA, and the other applicable laws into one non-duplicative and non-repetitive document. For that reason, the evaluation of alternatives and discussion about the effects on the environment is presented in **Section 4.0. Environmental Consequences**. This includes a detailed comparison between alternatives clearly justifying the Council's choice in the selection of the preferred alternative. **Section 2.0. Alternatives** summarizes that discussion. The Council and NOAA Fisheries concluded this meets NEPA's regulatory requirements.

2.1 **Features of the Alternatives Considered in Detail**

The six alternatives considered in detail are outlined in Table 3a. The only variance between Alternatives 1-5 is the designated time period extension and whether scheduled re-evaluations will occur. Alternative 1, the preferred, designates a scheduled re-evaluation by the Council to occur following 10 years and a Council review of the configuration and size of the area within 3 years of the publication date of the final rule. If the Council were not to take any action (Alternative 6), the regulations that prohibit fishing for and retention of snapper grouper species in the *Oculina* Experimental Closed Area would cease after June 27, 2004.

Table 3a. The six alternatives considered in detail. The preferred alternative is in bold.

	Size (nm ²)	Years that regulations are designated for	Fishing for and retention of snapper grouper species	Designated Council re-evaluation	Designated Council reconsideration of configuration and size
Alternatives					
1	92	Indefinite	Not allowed	after 10 years	after 3 years
2	92	10	Not allowed	None	None
3	92	20	Not allowed	None	None
4	92	50	Not allowed	None	None
5	92	Indefinite	Not allowed	None	None
6	0	0	Allowed	None	None

2.2 Comparison of the Impacts Between Alternatives 1-5 and the No Action Alternative

A summarized comparison of the impacts between alternatives 1-5 and alternative 6 is presented in Table 3b. The impacts are designated as Adverse, Potentially Adverse, Beneficial, and Potentially Beneficial as appropriate. In addition, the impacts are designated as short, medium, or long-term when apparent.

Table 3b. A summarized comparison of the impacts between alternatives 1-5 and alternative 6.

ISSUES	MANAGEMENT ALTERNATIVES	
	Alternatives 1-5 Continuation of the prohibition on fishing for and retention of snapper grouper species.	Alternative 6 No action. The regulations that prohibit fishing for and retention of snapper grouper within the <i>Oculina</i> Experimental Closed Area will sunset on June 27, 2004.
Biological Impacts	<p>Beneficial</p> <ul style="list-style-type: none"> + Would result in a reduction in bycatch of fish within the closed area. + Would increase the abundance of fish in the closed area. + Protection of nursery and spawning grounds within the closed area. + Protection of <i>Oculina</i> coral from habitat destruction. + Greater protection to sea turtles and candidate species in the snapper grouper complex. <p>Potentially beneficial</p> <ul style="list-style-type: none"> + Depending on the mobility of the populations and larvae, there could be a spillover effect to areas outside of the <i>Oculina</i> Experimental Closed Area. The existence/magnitude of a spillover effect has not been determined to date. 	<p>Potentially Adverse (if overfishing is to occur)</p> <ul style="list-style-type: none"> - Decrease in overall fish length. - Increase in unstable stock structure. - Harvesting of immature fish [see Coleman et al. (2000) for a review of implications of overharvesting snapper grouper species]. - Reduced protection to sea turtles and candidate species in the snapper grouper complex.
Economic Impacts	<p>Beneficial</p> <ul style="list-style-type: none"> + Non-use value for <i>Oculina</i>, snapper grouper and biodiversity to society. + Indirect use benefits to the commercial, for-hire and recreational fishing sectors that fish outside of the closed area. + Value of “insurance” or the hedge against future uncertainty in stock assessments. <p>Adverse</p> <ul style="list-style-type: none"> - Forgone consumer surplus (use value) benefits to the affected recreational fishing sector. - Forgone net revenue (use value) lost to the affected commercial harvesting sector. - Forgone net revenue (use value) lost to the affected for-hire sector. <p>Potentially adverse</p> <ul style="list-style-type: none"> - Potential displacement to other fisheries. - Potential reduction in overall effort in the fishery. 	<p>Beneficial</p> <ul style="list-style-type: none"> + Incremental net economic short-term benefits to recreational anglers, for-hire vessels and commercial fishermen. <p>Adverse</p> <ul style="list-style-type: none"> - Reduction of non-use benefits from habitat damage - Reduction of indirect use benefits from further habitat degradation (long-term effects).

ISSUES	Alternatives 1-5 Continuation of the prohibition on bottom fishing for and retention of snapper grouper species.	Alternative 6 No action. The regulations that prohibit fishing for and retention of snapper grouper within the <i>Oculina</i> Experimental Closed Area will sunset on June 27, 2004.
Social Impacts	<p>Beneficial + Protection of snapper grouper species, general species diversity, increase in fish numbers, and hedging against scientific uncertainty all bring intangible (non-use) and tangible (use) benefits to both the fishing and non-fishing population.</p> <p>Potentially beneficial + Over time increased catches from a possible spillover effect should benefit future fishermen in the area through an increase in both income and higher fishing satisfaction.</p> <p>Adverse - Minimal negative social impacts to either the recreational or commercial snapper grouper fishery.</p>	<p>Short-term Beneficial + Increased catches and satisfactory fishing experiences. Feeling of political “victory” for some stakeholders.</p> <p>Medium to Long Term Adverse - Continued regional overfishing would result in decreased catches for all fishermen. Social benefits (increased satisfaction and income related benefits) gained from sustainable fish populations would be lost in the long-term. Loss of “heritage” or “legacy” benefit to general public.</p> <p>Potentially adverse - Increase conflict and competition between and among recreational and commercial snapper grouper fishermen. Further denigration of sustainable ecosystem impacting society as a whole.</p>

2.3 Comparison of the Impacts Between Alternatives 1-5

Alternative 1, the preferred, is expected to provide the most biological, social, and economic benefits while allowing for adaptive management. Extending the prohibition on fishing for and the retention of snapper grouper species in the closed area (alternatives 1-5) would continue current protections to local snapper grouper populations and to *Oculina* coral and associated habitat functions, and would provide a hedge against the high degree of scientific uncertainty associated with the status of snapper grouper species. In addition, these alternatives are expected to reduce the possibility that snapper grouper populations may fall below sustainable levels and could potentially help rebuild those stocks already below those levels. Alternatives 1 and 5 are expected to provide greater biological, social, and economic benefits over the long term compared to the other alternatives as they would continue these protections indefinitely. However, the two scheduled re-evaluations proposed in Alternative 1 would allow the Council to be adaptive in the management of the *Oculina* Experimental Closed Area without the constraint of having to submit a plan amendment to ensure that the protections outlined above continue uninterrupted, if necessary. It is hoped that adaptive management in the form of scheduled re-evaluations will assure the public that this area will be monitored and reviewed. Such assurances are perceived as long-term positive impacts that are not associated with the other alternatives. As to ranking Alternatives 1-5 in terms of net economic impacts, the data and models that would indicate the "optimal" closure period to achieve the goal of maximizing net economic benefits are not available.

3.0 AFFECTED ENVIRONMENT

3.1 **Description of the Fishery/Affected Environment**

3.1.1 **Physical Environment**

3.1.1.1 **Geological Environment**

The *Oculina* Bank resides in close proximity to the continental shelf edge (i.e., 100-fathom (183 m; 600 ft) contour). The depth of the western edge of the *Oculina* Bank is approximately 55 m (180 ft), while the eastern boundary, located less than 3 miles east is approximately 122 m (400 ft). The northward end of the bank towards Cape Canaveral is more longitudinally compressed, with *Oculina* coral thriving in a corridor less than 2 miles across.

The geology of the *Oculina* Bank generally consists of sandy, silty, and muddy sediments, punctuated by limestone ridges and pinnacles locally known as “cones”. These cones are concentrated along the 79-m (260-ft) contour (Scanlon et al. 1999). Generally, the sediments found in the deeper portions of the *Oculina* Bank (e.g., at depths greater than 90 m (295 ft)) have a higher percentage of silt than do the sediments in the shallower areas to the west. Sediment samples taken near pinnacles and in scoured areas generally consist of sands and gravels, and contain less than 20% silt. Strong bottom currents have winnowed the sediments from the pinnacle and scoured areas, leaving behind only the coarser sands and gravels (Scanlon et al. 1999).

Oculina coral rubble can be a major component of the sediment. Anthropogenic and natural events can produce significant quantities of *Oculina* rubble. In some cases, this rubble accumulates in piles exceeding 1 m (3 ft) in depth. This is particularly evident on artificial reefs and shipwrecks, where the apparent natural succession of *Oculina* coral produces a layer of rubble underneath healthy coral thickets (M. Barnette, NOAA Fisheries, personal observation). While this rubble does not support as diverse a species assemblage of invertebrates and fishes as do healthy coral thickets, it does provide habitat for numerous invertebrate species. However, no detailed assessment or characterization of coral rubble has been accomplished. If the bathymetric relief presented by a pinnacle is sufficient to shelter the lee side from the influence of bottom currents, fine sediments can accumulate. In general, the finer-grained sediments have lower percentages of calcium carbonate than do the sands and gravels (Scanlon et al. 1999).

The geological origin and nature of the pinnacles has not been fully explained and documented. However, dredge samples obtained by Macintyre and Milliman (1970) from the pinnacles consisted mainly of oolitic limestones (made up of small spherical grains, usually of calcium carbonate, cemented together) with some algal limestones and had radiocarbon ages from the late Pleistocene to the early Holocene eras. The presence of shrimp (*Callinassa* sp.) burrows and relict hermatypic coral heads (containing symbiotic algae) suggests a shallow water origin. Macintyre and Milliman (1970) interpreted the pinnacles to be oolitic dunes that were deposited and petrified in a marine environment during the Holocene transgression. Subsequent erosion by the strong Gulf Stream currents and growth of ahermatypic (those without symbiotic algae) corals has produced the irregular high-relief pinnacles currently found on the *Oculina* Bank. The pinnacles vary in size and shape, but can rapidly rise as much as 18 m (60 ft) or more from the seabed. Figure 5 illustrates the location and nature of these pinnacles in the southern portion of the *Oculina* Bank (i.e., the *Oculina* Experimental Closed Area).

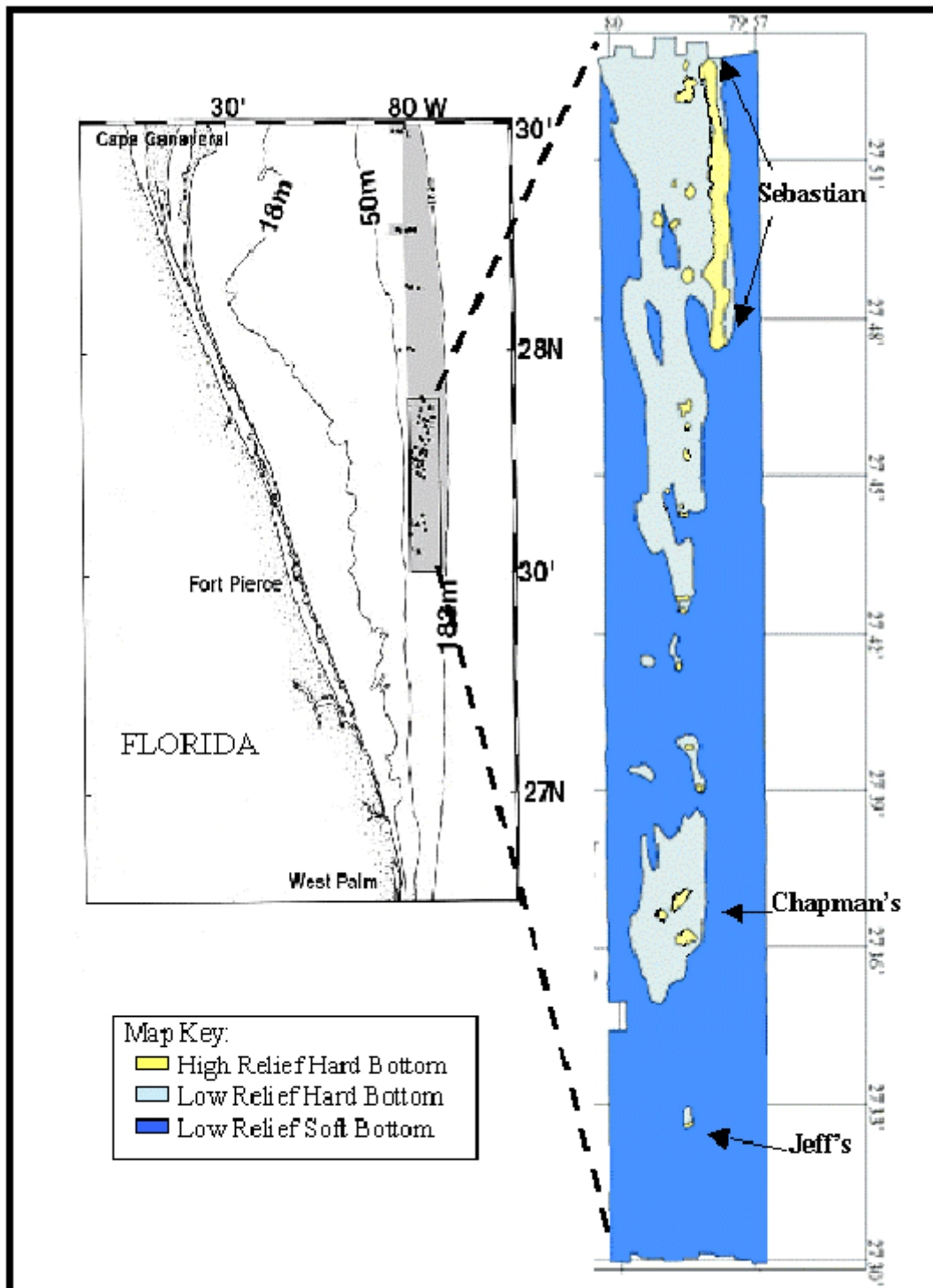


Figure 5. Profile of the *Oculina* Bank HAPC, emphasizing the dynamic bathymetry of the *Oculina* Experimental Closed Area. Source: Modified from Koenig et al. (in press).

* Recent dives indicated hard bottom and *Oculina* coral in areas keyed as soft bottom from side scan sonar.

The texture of the cones in the absence of *Oculina* coral is generally smooth and pockmarked. When colonized by *Oculina* coral, the habitat complexity and amount of surface area associated with the cones is greatly increased.

3.1.1.2 Oceanographic Environment

Due to its proximity to the shelf edge, as well as to the Gulf Stream, the *Oculina* Bank can experience extremely dynamic conditions. Typically, the Gulf Stream meanders inshore during the warmer summer months, bringing with it warm (e.g., 29° C; 85° F) surface waters and a swift, northward-moving current. A “rip”, as well as a distinct color change, indicating the delineation of the faster moving water body, usually marks the Gulf Stream current. This delineation may change daily or hourly. It is not uncommon for this boundary to be found west of the *Oculina* Bank (i.e., 80° W longitude). Gulf Stream surface currents as great as 4 knots (2 m/sec; 6.7 ft/sec) can be experienced.

The direction of the current typically is within a few degrees of due north. Bottom currents in the *Oculina* Bank generally are not as strong as the surface currents, and usually dissipate below the thermocline. However, in 2001, bottom currents approaching 3 knots (1.6 m/sec; 5.1 ft/sec) were experienced at a site within the *Oculina* Bank, in 88 m (290 ft) of water off Sebastian (M. Barnette, NOAA Fisheries, personal observation). On average, bottom currents of 1 to 1.5 knots (0.5 to 0.8 m/sec; 1.7 to 2.5 ft/sec) flow through the *Oculina* Bank (Scanlon et al. 1999; M. Barnette, NOAA Fisheries, personal observation; Koenig 2001). Currents at the sediment-water interface are undoubtedly less strong than those observed just above the sea floor, and are most likely on the order of 0.5 knots (0.2 m/sec; 0.8 ft/sec). However, that velocity would be enough to erode silt and sand (Hollister and Heezen 1972; Reineck and Singh 1980).

An interesting oceanographic anomaly produced by the *Oculina* Bank is a surface disturbance produced by current deflection off the limestone pinnacles. Depending on the intensity of the current, the depth to which it extends, as well as the amount of relief offered by a series of pinnacles, dramatic boils are formed on the water’s surface. On a calm day, these boils can reveal the pinnacles below to fishermen. This deflection may help transfer and distribute nutrients flowing in colder, slower-moving, bottom currents to the warmer, faster-moving, surface currents.

Periods of strong currents that cause this effect also may carry larvae farther north during their planktonic stage than would normally occur if retained in the slower-moving waters when the Gulf Stream is farther offshore. Recent work completed by Jon Hare (NOAA, National Ocean Service, Beaufort Laboratory) may act as supporting evidence of this effect. Researchers released satellite-tracked drifters from four sites in the *Oculina* Experimental Research Reserve. Of the 20 drifters released, 11 remained in the Gulf Stream and were transported north of Cape Hatteras where there is no appropriate juvenile habitat for snapper grouper species to settle out. Seven of the 20 drifters did move onto the shelf and were on the shelf for 35-50 days. Drifters moved onto the shelf during both late winter/early spring releases and summer releases. Release time coincided with the spawning seasons of gag, scamp, and several deepwater species (Memo from J.Hare to P. Thompson, 2003).

Frequently in the summer months, the central east coast of Florida can experience dramatic upwelling. Parcels of cold water move inshore from beyond the shelf edge, resulting in tremendous temperature fluctuations. Commonly, the bottom temperature on the *Oculina* Bank

averages 16° C (61° F). However, when an upwelling event occurs in the summer months, bottom temperatures can fall to 7° C (45° F) (Reed 1981). In June 2003, upwelling resulted in bottom temperatures of 9° C (48° F). Within the *Oculina* Bank, the thermocline began at a depth of 21 m (70 ft) (M. Barnette, NOAA Fisheries, personal observation).

These upwellings can affect the behavior of some species. In many cases, fish species will temporarily vacate a location where water temperatures are unsuitably cold, and move inshore to warmer waters. Noticeable reductions in the abundance of dominant fish species, such as amberjack, scamp, red barbier, roughtongue bass, gag, and Warsaw grouper, has been witnessed at several sites between 73-91 m (240-300 ft) depth, inside and just on the border of the *Oculina* Bank, at the onset of a cold-water upwelling (M. Barnette, NOAA Fisheries, personal observation). This behavior also has been observed by fishermen, who sometimes capture typical deep-water species, such as adult Warsaw grouper, in less than 30 m (100 ft) of water.

3.1.2 Biological Environment

3.1.2.1 Habitat

Amendment 10 to the Snapper Grouper Fishery Management Plan (SAFMC 1998b) describes habitat identified and described by the South Atlantic Council as essential to species in the snapper grouper fishery management unit (FMU). That amendment also describes HAPCs designated by the Council, as encouraged by the EFH Final Rule. The material presented in the Council's Final Habitat Plan for the South Atlantic Region (SAFMC 1998c) elaborates on the life history-habitat associations of species in the snapper grouper FMU, and on fishery-related impacts on EFH. The description of habitat provided in this section is restricted to *Oculina varicosa* coral.

Oculina varicosa is known to exist from the West Indies to North Carolina and Bermuda, occurring as small, random coral heads. However, off central Florida, from Ft. Pierce to Cape Canaveral, and at shelf-edge depths of 55-122 m (180-400 ft), *Oculina* forms unique populations of dense coral growth on naturally occurring limestone ridges and pinnacles, as well as on artificial reefs and shipwrecks. Within this discrete area (approximately 261 nm²) known as the *Oculina* Bank HAPC, *Oculina* colonies can grow in excess of 2 m (6 ft) in diameter in a thicket-like habitat. These coral thickets are the foundation for a diverse marine ecosystem, supporting numerous invertebrates and finfish species. The southern portion of the *Oculina* Bank HAPC includes the *Oculina* Experimental Closed Area. Three percent of that 92-nm² area (i.e., 2.76 nm²) consists of high-relief pinnacle habitat (Scanlon et al. 1999).

Oculina varicosa is a stony coral that forms large bush-like colonies up to 2 m (5 ft) tall and over 2 m (6 ft) in diameter, with dendritic branches extending from the base. These branches are composed primarily of aragonite, a bone like substance that forms the skeleton. Aragonite is produced by the process of calcification that takes place within the coral. Two different growth forms of *Oculina varicosa* have been identified: (1) shallow water *Oculina* and (2) deep water *Oculina*.

The shallow-water form occurs at depths of 2-37 m (6-120 ft) in the Caribbean, Gulf of Mexico, and South Atlantic, to Bermuda (Reed 1980). It is typically golden-brown in color due to the presence of zooxanthellae, a unicellular, dinoflagellate algae that lives symbiotically within the coral tissue. Photosynthesis by the zooxanthellae benefits the coral by providing it with oxygen and carbohydrates to enhance coral growth and utilizing its waste products. However, shallow-water *Oculina* does not form massive coral banks or reefs (Reed 1981).

The deep-water form of *Oculina* does not possess zooxanthellae (ahermatypic). Unlike hermatypic reefs that are solid, ahermatypic *Oculina* thickets are very fragile due to the nature of their construction and natural succession. As an *Oculina* colony grows, newer branches prevent water flow to the center of the colony, which subsequently dies due to decreased food resources and oxygen to the interior branches. Burrowing animals infest the dead coral, hollowing out the center of the tree-like formations. This makes *Oculina* exceedingly fragile, and eventually the colony may collapse on itself, though the new branches continue to grow and the process continues, creating large, unconsolidated thickets.

Oculina varicosa is a gonochoristic species (individuals are either male or female). The reproductive cycle begins in the early summer and spawning occurs during late summer and fall, with no obvious relationship to lunar or tidal phase. Females produce up to 1,250 eggs per individual, a fecundity level that is as high as that of many tropical coral species (Brooke 1998). This coral is a broadcast spawner, releasing sperm and small eggs (< 10 mm (0.4 in)) into the water column. Unlike many tropical reef corals, *Oculina* does not spawn in a single synchronized event. Instead, *Oculina* colonies continue to release gametes over a period of about one month. *Oculina* larvae, roughly 16 mm (0.6 in) in length, settle approximately 21 days after spawning (Brooke 1998).

Biodiversity of the deep-water *Oculina* reefs is similar to that of shallow tropical reefs. Quantitative surveys of the macro-invertebrate fauna associated with the *Oculina* coral reveal that this habitat supports very dense and diverse invertebrate communities (Reed et al. 1982; Reed and Mikkelsen 1987; Reed 2002). These studies report that 230 species of mollusks, 50 species of decapods, 47 species of amphipods, 21 species of echinoderms, 15 species of pycnogonids, 23 families of polychaetes, and numerous other invertebrate taxa utilize or depend on *Oculina* coral for habitat. Additionally, healthy *Oculina* thickets support numerous finfish species. Roughtongue bass (*Pronotogrammus martinisensis*) and red barbier (*Hemanthias vivanus*) are commonly observed in association with *Oculina* coral. Other species that appear to be abundant in this habitat include gag (*Mycteroperca microlepis*), scamp (*M. phenax*), speckled hind (*Epinephelus drummondhayi*), and pelagics, such as the greater amberjack (*Seriola dumerili*) and almaco jack (*S. rivoliana*) (Koenig et al. (in press)).

Massive colonies (> 2 m (6 ft) in diameter) of *Oculina* are usually found on the southern slopes and peaks of high-relief pinnacles that face into the Gulf Stream, where they benefit from the delivery of oxygenated water and planktonic food. Koenig et al. (in press) note that the presence of small, dead, standing colonies in low-relief sites suggests that these are marginal sites for survival and growth.

As mentioned in Section 3.1.1.2, the physical environment on the deep *Oculina* reefs is quite variable. Bottom temperature averages 16° C (61° F), and ranges from 7.4° C (45° F) during cold-water upwelling events, to 26.7° C (80° F) when the warm surface water impinges on the reefs (Reed 1981, 2002). Cold upwelling events also provide nutrient rich water to the reefs.

Due to the nature and structure of *Oculina* coral thickets, they are extremely susceptible to damage. Events that could potentially negatively degrade *Oculina* coral include extreme temperatures, excessive nutrient input, strong currents, disease, anchoring, and fishery-related impacts. However, *Oculina* already experiences a wide range of temperatures, as well as high nutrient and sediment input during annual upwelling events (Reed 1981, 1983), and appears to be quite tolerant of these two potential threats. Deep-water *Oculina* may be susceptible to pathogens that threaten similar shallow-water reef corals, however, there have been no directed studies of coral diseases on the *Oculina* Bank, and few in any other deep-water coral habitats.

Fishery-related impacts resulting from trawl, bottom longline, and fish trap activities have been documented to negatively impact coral habitat (Barnette 2001). It has been theorized that calico scallop and rock shrimp trawling activities have caused the vast majority of damage to *Oculina*, as evidenced in recent trawl tracks and *Oculina* rubble within the HAPC (C. Koenig, Florida State University, personal observation). Vertical gear (e.g., hook and line, bandit gear) also has the potential to adversely impact coral. The use of sinkers to transport bait to the bottom, particularly the heavier weights (> 227 g (8 oz)) used in the high current environment typically experienced on the *Oculina* Bank, can impact and break off branches of *Oculina* coral. Additionally, due to the size and shape of *Oculina* thickets, fishing line is easily entangled amongst its branches, which can result in increased fragmentation of *Oculina* colonies.

Oculina coral fragments may continue to survive after an impact (Brooke 1998). However, the likelihood that impacted corals could be smothered by sediments, or sufficiently removed from the current's influence as to deprive them of nutrients, is greatly increased. Due to past fishery-related impacts, primarily from trawl gear, it is estimated that there is less than 10% of intact *Oculina* coral habitat remaining within the *Oculina* Experimental Closed Area (Koenig et al., in press).

Impacts to *Oculina* coral reduce the amount of surface area available to other species. The value of intact *Oculina* coral thickets as habitat to finfish species is evident in Figures 6-8 (Koenig et al., in press). Fishery-related impacts also may reduce the height the coral extends into the water column, which can have an impact on coral feeding and spawning. High-relief coral colonies can more easily feed due to exposure to nutrient-loaded currents, which also facilitate dispersal of gametes during reproduction.

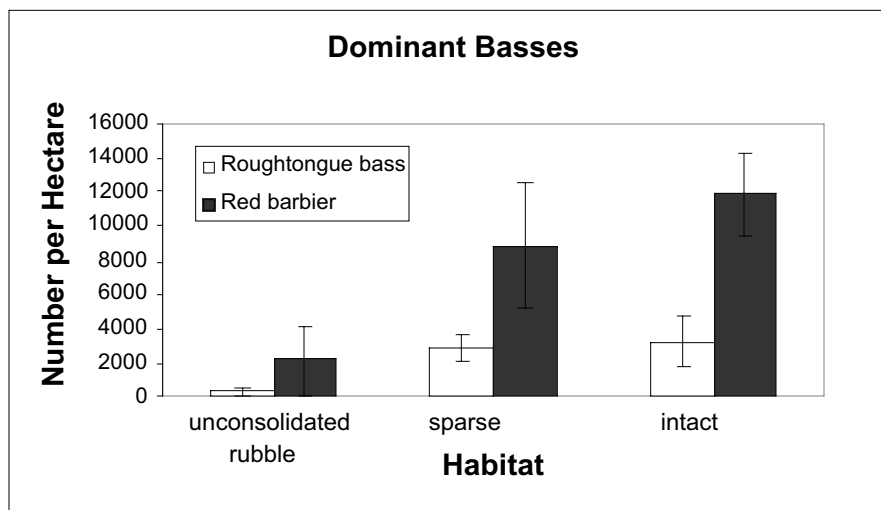


Figure 6. Population densities of dominant basses in three levels of coral habitat condition. Source: Koenig et al. (in press).

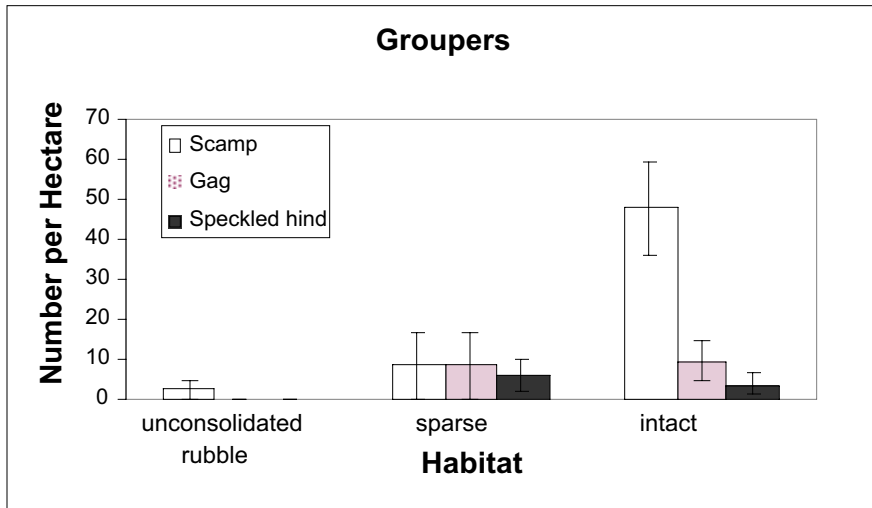


Figure 7. Population densities of dominant groupers in three levels of coral habitat condition. Source: Koenig et al. (in press).

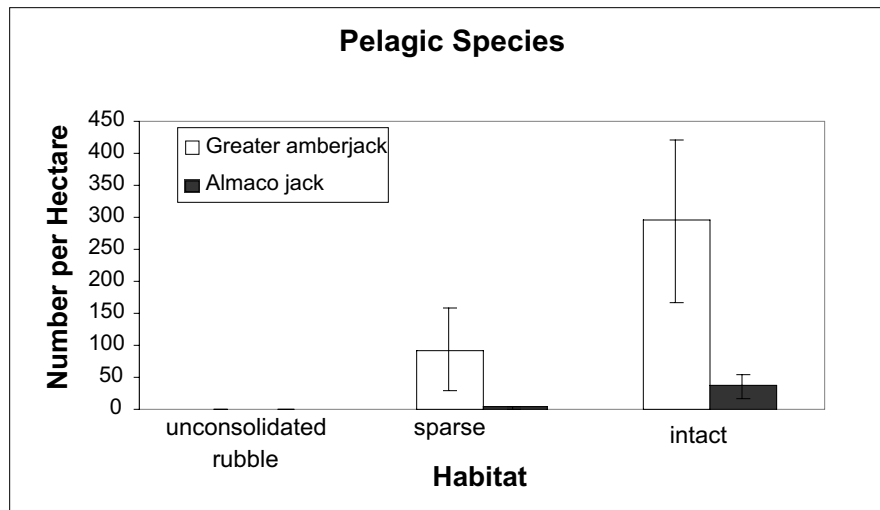


Figure 8. Population densities of dominant amberjack in three levels of coral habitat condition. Source: Koenig et al. (in press).

3.1.2.2 Species in the Snapper Grouper FMU

Available information on the depth distribution and habitat associations of species in the Snapper Grouper FMP indicates that 23 of the 73 species in the FMU may be affected by the proposed action (Table 4). These species represent a number of different families, including the Lutjanidae (snappers), Serranidae (groupers, hinds, and sea basses), Malacanthidae (tilefishes), Carangidae (jacks), and Sparidae (porgies). The common name and scientific name of each is listed in Table 4. Available information on the biology and status of each is summarized in this section.

Table 4. Species in the snapper grouper fishery management unit potentially affected by the proposed action, ranked by general abundance in the *Oculina* Experimental Closed Area based on Koenig et al. (in press) and documented depth distribution.

Common Name	Scientific Name	Depth Distribution (ft)
Greater amberjack	<i>Seriola dumerili</i>	60-1,181
Scamp	<i>Mycteroperca phenax</i>	98-328
Almaco jack	<i>Seriola rivoliana</i>	49-525
Gag	<i>Mycteroperca microlepis</i>	131-498
Snowy grouper	<i>Epinephelus niveatus</i>	98-1,722
Speckled hind	<i>Epinephelus drummondhayi</i>	98-1,312
Red snapper	<i>Lutjanus campechanus</i>	33-623
Vermilion snapper	<i>Rhomboplites aurorubens</i>	85-600
Red porgy	<i>Pagrus pagrus</i>	59-918
Warsaw grouper	<i>Epinephelus nigritus</i>	180-1,722
Knobbed porgy	<i>Calamus nodosus</i>	23-295
Blueline tilefish	<i>Caulolatilus microps</i>	98-774
Blackfin snapper	<i>Lutjanus buccanella</i>	164-300
Yellowedge grouper	<i>Epinephelus flavolimbatus</i>	210-902
Black sea bass	<i>Centropristis striata</i>	7-394
Bank sea bass	<i>Centropristis ocyurus</i>	180
Crevalle jack	<i>Caranx hippos</i>	3-1,148
Jolthead porgy	<i>Calamus bajonado</i>	10-656
Lesser amberjack	<i>Seriola fasciata</i>	180-427
Golden tilefish	<i>Lopholatilus chamaeleonticeps</i>	263-1,772
Silk snapper	<i>Lutjanus vivanus</i>	299-794
Queen snapper	<i>Etelis oculatus</i>	328-1,476
Misty grouper	<i>Epinephelus mystacinus</i>	327-1,803

3.1.2.2.1 Snappers, Lutjanidae

Snapper species that could be affected by the proposed action include the vermilion snapper, silk snapper, red snapper, black snapper, blackfin snapper, and queen snapper. Snapper species are generally slow growing and moderately long lived. All snappers have complex life histories, with most dependent on different habitats during the egg, larval, juvenile, and adult phases of their life cycle (AFS 2001). Generally, larger snappers inhabit deeper areas than smaller snappers, although there are many exceptions. Adults are generally sedentary and residential. Movement is usually localized and exhibits an offshore-inshore pattern that is probably associated with spawning events. Many species have been reported to form mass spawning aggregations, where hundreds or even thousands of fish convene to reproduce (Rielinger 1999). The snappers are generally serial spawners, releasing several batches of eggs over a spawning season that sometimes extends year round (SAFMC 1999). Annual fecundity reportedly ranges from 100,000 eggs released by young snappers and smaller species, to millions of eggs released by older snappers and larger species (SAFMC 1999; Thompson and Munro 1974). Eggs and early larvae are typically pelagic (AFS 2001).

Juveniles generally feed on shrimp, crab, worms, and small fish. Fishes become a more important component of their diet as snappers grow large and move offshore (SAFMC 1999). On reefs, snappers compete among themselves for food and space. Competition with groupers, jacks, moray eels, and grunts probably also occurs, although the extent of competition is not known.

Predators of juvenile snappers include large carnivorous fishes, such as jacks, groupers, sharks, barracudas, and morays, as well as large sea mammals and turtles (SAFMC 1999). Major reef species, such as sharks, groupers, and barracuda, are probably the most important predators of adult snappers (Thompson and Munro 1974).

3.1.2.2.1.1 Vermilion Snapper, *Rhomboplites aurorubens*

3.1.2.2.1.1.1 Biology

The vermilion snapper occurs in the Western Atlantic, ranging from North Carolina to Rio de Janeiro. It is most abundant off the southeastern United States and in the Gulf of Campeche (Hood and Johnson 1999). This fish is demersal, commonly found over rock, gravel, or sand bottoms near the edge of the continental and island shelves (Allen 1985, in Froese and Pauly 2003).

According to Allen (1985), in Froese and Pauly (2002), the vermilion snapper occurs in moderately deep waters from 180-300 m (590-984 ft) but suitable bottom type is probably more important than depth in influencing the distribution of this species (Boardman and Weiler 1979). According to the Report of the Vermilion Snapper Assessment Workshop (SAFMC, 2003a), it ranges from 18-122 m (59-400 ft) depth, but is most abundant at depths less than 55 m (180 ft). Individuals, particularly juveniles, often form large schools, which generally occur at shallower depths (Allen 1985, in Froese and Pauly 2003). This fish is not believed to exhibit extensive long range or local movement (Report of the Vermilion Snapper Assessment Workshop 2003).

The maximum size and weight for a male vermilion snapper, reported by Allen (1985), in Froese and Pauly (2002), was 60 cm (24 in) and 3,170 g (7 lbs), respectively. Maximum reported age in the South Atlantic Bight is 14 years (Zhao et al. 1997; Potts et al. 1998). This species is moderately resilient to overfishing, with a minimum population doubling time of 1.4 to 4.4 years (Allen 1985, in Froese and Pauly 2003). Ault et al. (1998) report the natural

mortality rate (M) of this species as 0.23. The Report of the Vermilion Snapper Assessment Workshop (2003) recommends that M be defined as 0.25/yr, with a range of 0.2-0.3/yr.

The vermilion snapper spawns in aggregations (Lindeman et al. 2000), from April through late September in the southeastern United States (Cuellar et al. 1996). Zhao et al. (1997) indicate that the peak spawning period in the South Atlantic Bight occurs from June through August. Eggs and larvae are pelagic. The duration of the larval life history stage is unknown (Report of the Vermilion Snapper Assessment Workshop 2003).

All vermilion snapper are mature at 2 years of age and 20 cm (7.9 in) in length (Report of the Vermilion Snapper Assessment Workshop 2003). All vermilion snapper examined by Cuellar et al. (1996) that were collected off the southeastern United States were mature. The smallest female was 16.5 cm (6.5 in) FL and the smallest male was 17.9 cm (7.1 in) FL (Cuellar et al. 1996). Zhao and McGovern (1997) reported that 100% of males that were collected after 1982 along the southeastern United States were mature at 14.0 cm (5.6 in) TL and age 1. All females collected after 1988 were mature at 18.0 cm (7.1 in) TL and age 1. This species preys on fishes, shrimps, crabs, polychaetes, and other benthic invertebrates, as well as cephalopods and planktonic organisms (Allen 1985, in Froese and Pauly 2003).

3.1.2.2.1.1.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), the vermilion snapper is considered to be overfished based on the pre-SFA definition of that term. Under that definition, the stock is overfished when the SPR falls below 30%. This stock also is considered to be experiencing overfishing, based on a post-SFA definition of the maximum fishing mortality threshold (MFMT). Overfishing is defined as a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP. The results of a recent vermilion snapper stock assessment were uncertain (Report of the Vermilion Snapper Assessment Workshop 2003). The base run demonstrated that total egg production in 2002 (E_{2002}) was greater than E_{MSY} (247×10^9) and, therefore, above the MSST (185×10^9). However, most sensitivity runs estimated that total egg production was below E_{MSY} and also below MSST. Estimates of F relative to MFMT were more consistent but still somewhat uncertain. All runs (base and sensitivity) indicated that F exceeded MFMT and that overfishing was occurring.

3.1.2.2.1.2 Silk Snapper, *Lutjanus vivanus*

3.1.2.2.1.2.1 Biology

The silk snapper occurs in the Western Atlantic, ranging from North Carolina to Brazil, including the Bahamas and the northern Gulf of Mexico. It is commonly found along rocky ledges, in depths of 91-242 m (299-794 ft) (Robins and Ray 1986). Adults are generally distributed further offshore than juveniles (SAFMC 1999), and usually ascend to shallow water at night (Allen 1985, in Froese and Pauly 2003). However, juveniles are sometimes observed on deep reefs (Robins and Ray 1986). Suitable bottom type is probably more important than depth in influencing the distribution of this species. These fish have been reported to form moving aggregations of similarly sized individuals (Boardman and Weiler 1979).

Spawning occurs in June, July, and August in waters off North and South Carolina (Grimes et al. 1977, in Grimes 1987). This species is of low resilience to overfishing, with a minimum population doubling time of 4.5-14 years. Maximum reported size is 83 cm (2.7 ft);

maximum weight, 8.32 kg (18.3 lb) (Allen 1985, in Froese and Pauly 2003). Size at maturity and age at first maturity are estimated at 43.4 cm (17.2 in) TL and 6.3 years, respectively (Froese and Pauly 2003). The approximate life span of the silk snapper is 28.7 years, and the natural mortality rate is 0.23 (Ault et al. 1998). Prey items include mainly fishes, shrimps, crabs, gastropods, cephalopods, tunicates and some pelagic items, including urochordates (Allen 1985, in Froese and Pauly 2003).

3.1.2.2.1.2.2 Status

The status of the silk snapper has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.1.3 Red Snapper, *Lutjanus campechanus*

3.1.2.2.1.3.1 Biology

The red snapper is found from North Carolina to the Florida Keys, and throughout the Gulf of Mexico to the Yucatan (Robins and Ray 1986). It can be found from depths of 10-190 m (33-623 ft). Adults usually occur over rocky bottoms. Juveniles inhabit shallow waters and are common over sandy or muddy bottom habitat (Allen 1985, in Froese and Pauly 2003).

This fish has a low resilience to overfishing, with a minimum population doubling time of 4.5-14 years. The maximum size reported for this species is 100 cm (39.7 in) TL (Allen 1985, in Froese and Pauly 2003; Robins and Ray 1986); maximum weight, 22.8 kg (50 lbs) (Allen 1985, in Froese and Pauly 2003). The maximum reported age is 53 years (Goodyear 1995, in Coleman et al. 2000).

In the U.S. South Atlantic Bight and in the Gulf of Mexico, Grimes (1987) reported that size at first maturity is 23.7 cm (9.3 in) FL. For red snapper collected along the Southeastern United States, White and Palmer (in review) found that the smallest mature male was 20.0 cm (7.9 in) TL, and the largest immature male was 37.8 cm (15 in) TL. The estimate of 50% maturity was 22.3 cm (8.8 in) TL for males and 37.8 cm (15 in) TL for females. Males were present in 86% of age 1, 91% of age 2, 100% of age 3, 98% of age 4, and 100% of older age fish. Mature females were present in 0% of age 1, 53% of age 2, 92% of age 3, 96% of age 4, and 100% of older age individuals. Red snapper were found to live for at least 45 years along the southeastern United States.

According to Grimes (1987), the spawning season of this species varies with location, but in most cases occurs nearly year round. White and Palmer (in review) report that the red snapper spawns from May to October, peaking July through September, in waters off the southeastern United States. Fishes, shrimps, crabs, worms, cephalopods, and some planktonic items, comprise the diet of the red snapper.

3.1.2.2.1.3.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), red snapper is considered to be overfished based on the pre-SFA definition of that term. Under that definition, the stock is overfished when the SPR falls below 30%. This stock also is considered to be experiencing overfishing, based on a post-SFA definition of the maximum fishing mortality threshold. Overfishing is defined as a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.1.4 Blackfin Snapper, *Lutjanus buccanella*

3.1.2.2.1.4.1 Biology

The blackfin snapper occurs in the Western Atlantic, generally ranging from North Carolina, southward, throughout the Bahamas, and the northern Gulf of Mexico, to southeast Brazil (Robins and Ray 1986). This is a demersal species. Adults inhabit deeper waters over sandy or rocky bottoms, and near drop-offs and ledges (Allen 1985, in Froese and Pauly 2003), ranging from 50-91 m (164-300 ft) (Robins and Ray 1986). Juveniles occur in shallower waters, often in depths of 35-50 m (115-164 ft) (Allen 1985, in Froese and Pauly 2003). Suitable bottom type is probably more important than depth in influencing the distribution of this species (Boardman and Weiler 1979). Juveniles are generally associated with reefs (Robins and Ray 1986) and are sometimes found in small schools (Thompson and Munro 1974).

Male blackfin snapper can reach sizes of 75 cm (29.8 in) and 14 kg (30.9 lbs). This fish is moderately resilient to overfishing, with a minimum population doubling time of 1.4-4.4 years (Allen 1985, in Froese and Pauly 2003). The natural mortality rate of this species is 0.23 (Ault et al. 1998). Allen (1985), in Froese and Pauly (2002) identifies fishes as the primary prey item of blackfin snapper.

3.1.2.2.1.4.2 Status

The status of the blackfin snapper has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.1.5 Queen Snapper, *Etelis oculatus*

3.1.2.2.1.5.1 Biology

The queen snapper occurs in the Western Atlantic Ocean, ranging from Bermuda and North Carolina to Brazil, including the Gulf of Mexico. This fish is bathydemersal (Allen 1985, in Froese and Pauly 2003), and is generally found along steep rocky slopes, at or near the edge of the continental shelf (Robins and Ray 1986) in the Western Atlantic. Allen (1985), in Froese and Pauly (2002), indicates that queen snapper are primarily found over rocky bottom habitat, at depths of 100-450 m (328-1,476 ft).

This fish is moderately resilient to overfishing, with a minimum population doubling time of 1.4 to 4.4 years. Maximum reported size is 100 cm (39.4 in) TL (male). Maximum reported weight is 5.3 kg (11.7 lb) (Allen 1985, in Froese and Pauly 2003). Size at maturity and age at

first maturity are estimated as 53.6 cm (21.1 in) and 1 year, respectively. Approximate life span is 4.7 years; natural mortality rate, 0.76 (Froese and Pauly 2003). Primary prey items include small fishes and squids (Allen 1985, in Froese and Pauly 2003).

3.1.2.2.1.5.2 Status

The status of the queen snapper has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.2 Groupers, Hinds, and Sea Basses, Serranidae

Serranids that could be affected by the proposed action include the gag, scamp, snowy grouper, yellowedge grouper, Warsaw grouper, speckled hind, misty grouper, black sea bass, and bank sea bass. Serranids are usually solitary and territorial, but some gather in large groups to spawn (Robins and Ray 1986). Some species are functional hermaphrodites (have active male and female gonads simultaneously) (Nelson 1994, in Froese and Pauly 2003).

3.1.2.2.2.1 Groupers

Grouper species are generally long-lived (Robins and Ray 1986). Protogyny occurs in almost all species — smaller individuals function first as females, then transform into males with growth (Robins and Ray 1986). Most individuals spawn during a restricted period of several months, which varies with species (Shapiro 1987). Many groupers, but especially the largest *Epinephelus* species, appear to be the resident apex predators of the reef systems that they inhabit (Huntsman et al. 1999).

3.1.2.2.2.1.1 Gag grouper, *Mycteroperca microlepis*

This species is one of the most commonly observed within the *Oculina* Experimental Closed Area, of all species in the Snapper Grouper FMU (Gilmore and Jones 1992; Koenig, in press).

3.1.2.2.2.1.1.1 Biology

The gag occurs in the Western Atlantic, ranging from North Carolina to the Yucatan Peninsula, and throughout the Gulf of Mexico. Juveniles are sometimes observed as far north as Massachusetts (Heemstra and Randall 1993, in Froese and Pauly 2003). This fish commonly occurs at depths of 131-498 ft (Heemstra and Randall 1993, in Froese and Pauly 2003) and, reportedly, prefers inshore-reef and shelf-break habitats (Hood and Schlieder 1992). Bullock and Smith (1991) indicate that gag probably do not move seasonally between reefs, but do show a gradual shift toward deeper water with age. McGovern et al. (in review) reported extensive movement of gag. In a tagging study, 23% of the 435 recaptured gag moved distances greater than 185 km. Most of these individuals were tagged off South Carolina and were recaptured off Georgia, Florida, and in the Gulf of Mexico.

The gag is probably estuarine dependent (Keener et al. 1988). Juveniles (age 0) occur in shallow grass beds along Florida's east coast during the late spring and summer (Bullock and Smith 1991). Post larval gag enter South Carolina estuaries at a size of 13 mm TL and age of 40

days during April and May each year (Keener et al. 1988) and utilize oyster shell rubble as a nursery. Juveniles remain in estuarine waters throughout the summer and move offshore as water temperatures cool during September and October. Adults are often seen in shallow water 5-15 m (16-49 ft) above the reef (Bullock and Smith 1991) and as far as 40-70 km offshore.

The gag has a low resilience to overfishing, with a minimum population doubling time of 4.5-14 years. It grows to over 145 cm (57.5 in) TL, 36.5 kg (81 lbs) (Heemstra and Randall 1993, in Froese and Pauly 2003), and can live for at least 26 years (Harris and Collins 2000). This fish is protogynous. All individuals less than 87.5 cm (34.7 in) TL are females. At 105 cm (41.6 in) TL, 50% of fishes are males. Almost all gag are males at sizes greater than 120 cm (48 in) TL (McGovern et al. 1998). Along the southeastern United States, size at first maturity is 50.8 cm (20.2 in) TL, and 50% of gag females are sexually mature at 62.2 cm (24.7 in).

According to Harris and Collins (2000), age-at-first-maturity is 2 years, and 50% of gag are mature at 3 years. Collins et al. (1998) report that the smallest female spawners are almost 58 cm (23 in) TL and 3 years old. Hood and Schlieder (1992) indicate that most females reach sexual maturity at ages 5-7 in the Gulf of Mexico. Off the southeastern United States, gag spawns from December through May, with a peak in March and April (McGovern et al. 1998). Planktonic larval duration is about 42 days (Keener et al. 1988; Lindeman et al. 2000).

Adults are sometimes solitary, and sometimes occur in groups of 5 to 50 individuals. They feed primarily on fishes, crabs, shrimps, and cephalopods (Heemstra and Randall 1993, in Froese and Pauly 2003), and often forage in small groups far from the reef ledge (Bullock and Smith 1991). Juveniles feed primarily on crustaceans, and begin to consume fishes when they reach about 25 mm (1 in) in length (Reid 1954; K. Peters, unpublished data, in Bullock and Smith 1991; Mullaney 1994).

3.1.2.2.1.1.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), the South Atlantic stock of gag is not considered to be overfished based on the pre-SFA definition of that term. Under that definition, the stock is overfished when the SPR falls below 30%. This stock is considered to be experiencing overfishing, based on a post-SFA definition of the MFMT. Overfishing is defined as a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.1.2 Scamp, *Mycteroperca phenax*

This species is one of the most commonly observed within the *Oculina* Experimental Closed Area of all species in the Snapper Grouper FMU (Gilmore and Jones 1992; Koenig et al., in press).

3.1.2.2.1.2.1 Biology

The scamp occurs in the Western Atlantic, from North Carolina to Key West, in the Gulf of Mexico, and in the southern portion of the Caribbean Sea. Juveniles are sometimes encountered as far north as Massachusetts (Heemstra and Randall 1993, in Froese and Pauly 2003). This species is documented to occur in areas of living *Oculina* coral off the east coast of Florida (Gilmore and Jones 1992). Heemstra and Randall (1993), in Froese and Pauly (2002), report that it was the most abundant grouper in areas of living *Oculina* coral formations at depths of 70-100 m (230-328 ft) off the east coast of Florida. Its reported depth range is 30-100 m (98-

328 ft) (Heemstra and Randall 1993, in Froese and Pauly 2003). Juveniles are found in estuarine and shallow coastal waters (Bullock and Smith 1991; Heemstra and Randall 1993, in Froese and Pauly 2003).

This fish has a low resilience to overfishing, with a minimum population doubling time of 4.5-14 years (Heemstra and Randall 1993, in Froese and Pauly 2003). Scamp are protogynous, with females dominating sizes less than 70 cm (27.8 in) (Harris et al. 2002). Scamp live for at least 30 years (Harris et al. 2002), and attain sizes as great as 107 cm (42.4 in) TL and 14.2 kg (31.3 lbs) (Heemstra and Randall 1993, in Froese and Pauly 2003). Harris et al. (2002) report that the length and age at first spawning of females off North Carolina to southeast Florida was 30-35 cm (11.9-13.8 in) TL and age 1. Length and age at 50% maturity was 35.3 cm (13.9 in) TL and 1.28 years, respectively (Harris et al. 2002). In a study conducted in the eastern Gulf of Mexico, all fish larger than 35 cm were sexually mature (M. Godcharles and L. Bullock, unpublished data).

Spawning occurs from February through July in the South Atlantic Bight and in the Gulf of Mexico, with a peak in March to mid-May (Harris et al. 2002; based on oocyte development, M. Godcharles and L. Bullock, unpublished data). Fish constitute the primary prey item (Matheson et al. 1986).

3.1.2.2.2.1.2.2 Status

The scamp stock in the South Atlantic is not considered to be overfished based on the pre-SFA definition of that term. Under that definition, the stock is overfished when the SPR falls below 30%. This stock is not considered to be experiencing overfishing, based on a post-SFA definition of the MFMT. Overfishing is defined as a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.2.1.3 Snowy grouper, *Epinephelus niveatus*

This species is one of the most commonly observed within the *Oculina* Experimental Closed Area of all species in the Snapper Grouper FMU (Gilmore and Jones 1992; Koenig et al. (in press)).

3.1.2.2.2.1.3.1 Biology

The snowy grouper occurs in the Eastern Pacific and in the Western Atlantic, where it ranges from Massachusetts to southeastern Brazil, including the northern Gulf of Mexico (Robins and Ray 1986). It ranges from depths of 30-525 m (98-1,722 ft). Adults occur offshore over rocky bottom habitat. Juveniles are often observed inshore (Heemstra and Randall 1993, in Froese and Pauly 2003).

The snowy grouper has a low resilience to overfishing, with a minimum population doubling time of 4.5-14 years (Heemstra and Randall 1993, in Froese and Pauly 2003). It is protogynous. The smallest male and youngest male examined by Wyanski et al. (2000) was 72.7 cm (28.8 in) TL and age 8. The median size and age of snowy grouper was 91.9 cm (34.5 in) and age 16. This species has been documented to attain sizes as great as 122 cm (48 in) TL and 30 kg (66 lbs), and to survive up to 27 years (Heemstra and Randall 1993, in Froese and Pauly 2003). In a study of snowy grouper off of North and South Carolina, Wyanski et al. (2000) found that 50% of the females were mature at 54.1 cm (21.3 in) TL and 5 years of age. The

smallest mature female was 46.9 cm (18.5 in) TL; the largest immature female, 57.5 cm (22.6 in) TL.

Females in spawning condition have been captured off western Florida during May, June, and August (Bullock and Smith 1991). In the Florida Keys, ripe individuals have been observed from April to July (Moore and Labinsky 1984). Spawning seasons reported by other researchers are as follows: South Atlantic (north of Cape Canaveral), April through September (Wyanski et al. 2000) and April through July (Parker and Mays 1998); and South Atlantic (south of Cape Canaveral), May through July (Manooch 1984). Wyanski et al. (2000) report that snowy grouper spawn at depths from 176-232 m (577-761 ft) off South Carolina. Adults feed on fishes, gastropods, cephalopods, and crustaceans (Heemstra and Randall 1993, in Froese and Pauly 2003).

3.1.2.2.2.1.3.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), the South Atlantic stock of snowy grouper is considered to be overfished based on the pre-SFA definition of that term. Under that definition, the stock is overfished when the SPR falls below 30%. This stock also is considered to be experiencing overfishing, based on a post-SFA definition of the MFMT. Overfishing is defined as a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.2.1.4 Yellowedge Grouper, *Epinephelus flavolimbatus*

3.1.2.2.2.1.4.1 Biology

The yellowedge grouper occurs in the Western Atlantic, ranging from North Carolina to southern Brazil, including the Gulf of Mexico. A solitary, demersal, deep-water species, the yellowedge grouper occurs in rocky areas and on sand mud bottom, at depths ranging from 64-275 m (210-902 ft). On soft bottom habitats, this fish is often seen in or near trenches or burrow-like excavations (Heemstra and Randall 1993, in Froese and Pauly 2003).

This species has low resilience to overfishing, with a minimum population doubling time of 4.5-14 years. Maximum reported size is 114 cm (45.3 in) TL (male); maximum weight, 18.6 kg (41 lbs). Maximum reported age is 32 years (Heemstra and Randall 1993, in Froese and Pauly 2003). Natural mortality rate is estimated as 0.20 (Froese and Pauly 2003).

This fish is protogynous (Bullock et al. 1996). Estimated size and age at first maturity is 50.5 cm (19.9 in) TL and 6.2 years, respectively (Froese and Pauly 2003). A study conducted by Bullock et al. (1996) in the Gulf of Mexico reported that 50% of fishes are mature at 22.4 in, and that 50% of females transform into males by the time they reach 81 cm (32.2 in) TL. Spawning occurs from April through October in the South Atlantic (Keener 1984; Manooch 1984; Parker and Mays 1998). Ripe females were found in the eastern Gulf of Mexico from May through September (Bullock et al. 1996). A wide variety of invertebrates (mainly brachyuran crabs) and fishes comprise the diet of this species (Bullock and Smith 1991; Heemstra and Randall 1993, in Froese and Pauly 2003).

3.1.2.2.2.1.4.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), the yellowedge grouper is not considered to be overfished based on the pre-SFA definition of that term. Under that definition, the stock is overfished when the SPR falls below 30%. This stock is not considered to be experiencing overfishing, based on a post-SFA definition of the MFMT. Overfishing is defined as a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.2.1.5 Warsaw Grouper, *Epinephelus nigritus*

This species is one of the most commonly observed within the *Oculina* Experimental Closed Area of all species in the Snapper Grouper FMU (Gilmore and Jones 1992; Koenig et al. in press).

3.1.2.2.2.1.5.1 Biology

The Warsaw grouper occurs in the Western Atlantic, ranging from Massachusetts to southeastern Brazil (Robins and Ray 1986), and in the Gulf of Mexico (Smith 1971). This fish is a solitary species (Heemstra and Randall 1993, in Froese and Pauly 2003), usually found on rocky ledges and seamounts (Robins and Ray 1986), at depths from 55-525 m (180-1,722 ft) (Heemstra and Randall 1993, in Froese and Pauly 2003). Young are sometimes observed in inshore waters (Robins and Ray 1986), on jetties and shallow reefs (Heemstra and Randall 1993, in Froese and Pauly 2003).

The Warsaw grouper has a low resilience to overfishing, with a minimum population doubling time of 4.5-14 years. Maximum reported size is 230 cm (91 in) TL (Heemstra and Randall 1993, in Froese and Pauly 2003); maximum weight, 263 kg (580 lbs) (Robins and Ray 1986). This species spawns during August, September, and October in the Gulf of Mexico (Peter Hood, NOAA Fisheries, personal communication), and during April and May off Cuba (Naranjo 1956). Adults feed on benthic invertebrates and on fishes (Heemstra and Randall 1993, in Froese and Pauly 2003).

3.1.2.2.2.1.5.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), the South Atlantic stock of Warsaw grouper is considered to be overfished based on the pre-SFA definition of that term. Under that definition, the stock is overfished when the SPR falls below 30%. This stock also is considered to be experiencing overfishing, based on a post-SFA definition of the MFMT. Overfishing is defined as a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.2.1.6 Speckled Hind, *Epinephelus drummondhayi*

The speckled hind is one of the most commonly observed within the *Oculina* Experimental Closed Area of all species in the Snapper Grouper FMU (Gilmore and Jones 1992; Koenig et al. in press).

3.1.2.2.2.1.6.1 Biology

The speckled hind occurs in the Western Atlantic Ocean, ranging from North Carolina and Bermuda to the Florida Keys, and in the northern and eastern Gulf of Mexico (Heemstra and Randall 1993, in Froese and Pauly 2003). This fish is a solitary, bathydemersal species, found in depths ranging from 25 m (98 ft) (Heemstra and Randall 1993, in Froese and Pauly 2003) to 400 m (1,312 ft) (Bullock and Smith 1991). Heemstra and Randall (1993), in Froese and Pauly (2002), report that it most commonly occurs at depths of 60-120 m (197-394 ft). Bullock and Smith (1991) indicate that most commercial catches are taken from depths of 50 m (164 ft) or more. Juveniles occur in shallower waters.

This fish has a low resilience to overfishing, with a minimum population doubling time of 4.5-14 years. Maximum reported size is 110 cm (43.3 in) TL; maximum weight, 30 kg (66 lbs) (Heemstra and Randall 1993, in Froese and Pauly 2003). The maximum size and age of individuals examined by Matheson and Huntsman (1984) in the South Atlantic Bight was 110 cm (43.3 in) and 15 years, respectively. Heemstra and Randall (1993), in Froese and Pauly (2002), reported a maximum age of 25 years. Estimated size at maturity is 81.1 cm (32 in); natural mortality rate, 0.14 (Froese and Pauly 2003).

The speckled hind is thought to form spawning aggregations (G. Gilmore, Dynamac Corporation, personal communication). Spawning reportedly occurs from July to September (Heemstra and Randall 1993, in Froese and Pauly 2003). Prey items include fishes, crustaceans, and squids (Bullock and Smith 1991; Heemstra and Randall 1993, in Froese and Pauly 2003).

3.1.2.2.2.1.6.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), speckled hind is considered to be overfished based on the pre-SFA definition of that term. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.2.1.7 Misty grouper, *Epinephelus mystacinus*

3.1.2.2.2.1.7.1 Biology

The misty grouper occurs in the Western and Eastern Atlantic Ocean (Heemstra and Randall 1993, in Froese and Pauly 2003). In the Western Atlantic, it ranges from Bermuda and the Bahamas, southward to Brazil (Robins and Ray 1986). This fish is a solitary, bathydemersal species. Adults generally occur at depths from about 100-550 m (327-1,803 ft) (Robins 1967). Juveniles occur in shallower waters (e.g., 30 m (98 ft)).

Virtually nothing is known about the age, growth, and reproduction of this species. Maximum reported size is 160 cm (63 in) TL and 100 cm (39 in) TL for males and females, respectively. Maximum reported weight is 107 kg (236 lbs) (Heemstra and Randall 1993, in Froese and Pauly 2003). The estimated size at maturity is 81.1 cm (31.9 in); natural mortality rate, 0.14 (Froese and Pauly 2003). This species feeds primarily on fishes, crustaceans, and squids (Heemstra and Randall 1993, in Froese and Pauly 2003).

3.1.2.2.2.1.7.2 Status

The status of the misty grouper has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.2.2 Sea Basses

Sea basses are found primarily in temperate waters over hard bottom, rocks, jetties, and ledges. All species are protogynous — females become males with growth and age (Robins and Ray 1986).

3.1.2.2.2.2.1 Black Sea Bass, *Centropristis striata*

3.1.2.2.2.2.1.1 Biology

The black sea bass occurs in the Western Atlantic, ranging from Maine to northeastern Florida, and in the eastern Gulf of Mexico. It can be found in extreme south Florida during cold winters (Robins and Ray 1986). Separate populations were reported to exist to the north and south of Cape Hatteras, North Carolina (Wenner et al. 1986). However, genetic similarities suggest that this is one stock (McGovern et al. 2002). This species is common around rock jetties and on rocky bottoms in shallow water (Robins and Ray 1986) at depths from 2-120 m (7-394 ft). Most adults occur at depths from 20-60 m (66-197 ft) (Vaughan et al. 1995) but have been known to occur in 73-110 m (240-360 ft) off central Florida (Ben Hartig, Chair, SAFMC King and Spanish Mackerel Advisory Panel, personal communication).

Maximum reported size is 66 cm (26 in) TL; maximum reported weight, 3.6 kg (7.9 lbs). (McGovern et al. 2002). Maximum reported age is 10 years + (Report of the Black Sea Bass Stock Assessment Workshop, SAFMC 2003b). The minimum size and age of maturity for females studied off the southeastern U.S. coast is 10 cm (4 in) SL and age 0. All females are mature by 18 cm (7 in) SL and age 3 (McGovern et al. 2002). Wenner et al. (1986) report that spawning occurs from March through May in the South Atlantic Bight. Another study in this subject area identifies January through May as the spawning season of this species, with a peak in March and April (McGovern et al. 2002). Spawning occurs in the evening (McGovern et al. 2002).

In the eastern Gulf of Mexico and off North Carolina, females predominate in the first 5 year classes. Individuals over the age of 5 are more commonly males. Black sea bass live for at least 10 years. The diet of this species is generally composed of shrimp, crab, and fish (Reid 1954; Sedberry 1988).

3.1.2.2.2.2.1.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), the black sea bass is considered to be overfished and to be experiencing overfishing based on post-SFA definitions of those terms. The stock is overfished when stock biomass falls below 3.72 million pounds (1.69 million kg). This stock is considered to be undergoing overfishing when the fishing mortality rate is in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.2.2 Bank Sea Bass, *Centropristis ocyurus*

3.1.2.2.2.2.1 Biology

The bank sea bass occurs in the Western Atlantic, ranging from North Carolina to northeastern Florida (Cape Canaveral), and throughout the Gulf of Mexico, including the Florida Keys (Robins and Ray 1986). It prefers hard bottoms and depths of about 55 m (180 ft) (Robins and Ray 1986). Maximum reported size is 30 cm (11.9 in) (Robins and Ray 1986).

3.1.2.2.2.2.2 Status

The status of the bank sea bass has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.3 Tilefish, Malacanthidae

Malacanthids that could be affected by the proposed action include the golden tilefish and blueline tilefish. Members of this family are found primarily on the deep continental shelf and upper slope. Some species build large sand and rubble mounds, which provide habitat for other fishes. Other species occur mostly on hard, rubble-strewn bottom or at rocky outcroppings (Robins and Ray 1986). Tilefishes eat primarily fish and invertebrates (Lindeman et al. 2000).

3.1.2.2.3.1 Golden Tilefish, *Lopholatilus chamaeleonticeps*

3.1.2.2.3.1.1 Biology

The golden tilefish, also commonly known as the tilefish, is distributed throughout the Western Atlantic, occurring as far north as Nova Scotia, to southern Florida, and in the eastern Gulf of Mexico (Robins and Ray 1986). According to Dooley (1978), in Froese and Pauly (2002), the tilefish occurs at depths of 80-540 m (263-1,772 ft). Robins and Ray (1986) report the depth range of this fish as 82-275 m (270-900 ft). It is most commonly found at about 200 m (656 ft) depth, usually over mud or sand bottom but, occasionally, over rough bottom habitat (Dooley 1978, in Froese and Pauly 2003).

The tilefish has a low resilience to overfishing, with a minimum population doubling time of 4.5-14 years. Maximum reported size is 125 cm (50 in) TL; maximum weight, 30 kg (66 lbs) (Dooley 1978, in Froese and Pauly 2003; Robins and Ray 1986). Maximum reported age is 35 years (Dooley 1978, in Froese and Pauly 2003). Palmer et al. (in press) report that this species spawns off the southeast coast of the United States from March through late July, with a peak in April. Grimes et al. (1988) indicate that peak spawning occurs from May through September in waters north of Cape Canaveral. Shrimp and crabs are the primary prey items of this species. However, tilefish also feed on fishes, squid, bivalves, and holothurians (Dooley 1978, in Froese and Pauly 2003).

3.1.2.2.3.1.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), the tilefish is considered to be overfished based on the pre-SFA definition that the stock is overfished when the SPR falls below 30%. This stock also is considered to be experiencing overfishing, based on a post-SFA definition of the MFMT.

Overfishing is defined as a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.3.2 Blueline Tilefish, *Caulolatilus microps*

3.1.2.2.3.2.1 Biology

The blueline tilefish occurs in the Western Atlantic Ocean, ranging from North Carolina to southern Florida and Mexico, including the northern (and probably eastern) Gulf of Mexico (Dooley 1978, in Froese and Pauly 2003). Blueline tilefish are found along the outer continental shelf, shelf break, and upper slope on irregular bottom with ledges or crevices, and around boulders or rubble piles in depths of 30-236 m (98-774 ft) and temperatures ranging from 15-23° C (59-73.4° F) (Ross 1978; Ross and Hunstman 1982; Robins and Ray 1986; Parker and Mays 1998).

This fish has a low resilience to overfishing, with a minimum population doubling time of 4.5-14 years. Maximum reported size is 90 cm (35.7 in) TL; maximum weight, 7 kg (15 lbs) (Dooley 1978, in Froese and Pauly 2003). Blueline tilefish live for at least 42 years. Spawning occurs at night, from February to October, with a peak in May at depths of 48-232 m (157-761 ft) (Harris and Wyanski (in review)). This species feeds primarily on benthic invertebrates and fishes (Dooley 1978, in Froese and Pauly 2003).

3.1.2.2.3.2.2 Status

The status of the blueline tilefish has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.4 Jacks, Carangidae

Carangids that could be affected by the proposed action include the greater amberjack, lesser amberjack, almaco jack, and crevalle jack.

3.1.2.2.4.1 Greater amberjack, *Seriola dumerili*

The greater amberjack is one of the most commonly observed within the *Oculina* Experimental Closed Area of all species in the Snapper Grouper FMU (Gilmore and Jones 1992; Koenig et al., in press).

3.1.2.2.4.1.1 Biology

The greater amberjack is a pelagic and epibenthic member of the family Carangidae (Manooch and Potts 1997a). This species occurs in the Indo-West Pacific, and in the Western and Eastern Atlantic Oceans. In the Western Atlantic, it ranges as far north as Nova Scotia, Canada, southward to Brazil, including the Gulf of Mexico (Paxton et al. 1989, in Froese and Pauly 2003; Manooch and Potts 1997a, b). The greater amberjack is found at depths of 18-360 m (60-1,181 ft). It inhabits deep seaward reefs, rocky outcrops or wrecks and, occasionally, coastal bays. Juveniles and adults occur singly or in schools in association with floating plants or debris in oceanic and offshore waters.

This species is the largest jack (Robins and Ray 1986). Maximum reported size is 190 cm (75 in); maximum weight, 80.6 kg (177.7 lbs) (Paxton et al. 1989, in Froese and Pauly 2003). Size at maturity and age at first maturity is estimated as 78.8 cm (31.3 in) TL and 2.3 years, respectively. This species lives up to 17 years (Manooch and Potts 1997a) and is moderately resilient to overfishing, with a minimum population doubling time of 1.4-4.4 years. The estimated natural mortality rate is 0.40 (Froese and Pauly 2003). The spawning season ranges from January to June with peak spawning occurring during January to March (MARMAP, unpublished data). Primary food items include fishes, such as bigeye scad, and invertebrates (Paxton et al. 1989, in Froese and Pauly 2003).

3.1.2.2.4.1.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), the greater amberjack is not considered to be overfished based on the pre-SFA definition of that term. Under that definition, the stock is overfished when the SPR falls below 30%. This stock is not considered to be experiencing overfishing, based on a post-SFA definition of the MFMT. Overfishing is defined as a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.4.2 Lesser Amberjack, *Seriola fasciata*

3.1.2.2.4.2.1 Biology

The lesser amberjack occurs in the Eastern and Western Atlantic Oceans. In the Western Atlantic, it ranges from Massachusetts to Brazil (Robins and Ray 1986). This is a benthopelagic species, primarily found in depths of 55-130 m (180-427 ft) (Smith-Vaniz et al. 1990, in Froese and Pauly 2003). Maximum reported size is 68 cm (27 in) FL (Claro 1994, in Froese and Pauly 2003). It feeds on squids and fishes (Smith-Vaniz et al. 1990, in Froese and Pauly 2003).

3.1.2.2.4.2.2 Status

The status of the lesser amberjack has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently revising the Status Determination Criteria in Amendment 13B to the Snapper Grouper F.M.P.

3.1.2.2.4.3 Almaco Jack, *Seriola rivoliana*

The almaco jack is one of the most commonly observed within the *Oculina* Experimental Closed Area of all species in the Snapper Grouper FMU (Gilmore and Jones 1992; Koenig et al., in press).

3.1.2.2.4.3.1 Biology

The almaco jack occurs in the Indo-West Pacific, in the Eastern Pacific, and in the Western Atlantic, where it ranges from Massachusetts to northern Argentina. This species is thought to occur in the Eastern Atlantic as well, but the extent of its distribution there is not well established (Myers 1991, in Froese and Pauly 2003). A benthopelagic species, the almaco jack inhabits outer reef slopes and offshore banks, generally at depths from 15-160 m (49-525 ft). It

has been observed to occur in small groups. Juveniles are often seen around floating objects (Myers 1991, in Froese and Pauly 2003).

Maximum reported size is 160 cm (60 in) FL (male); maximum weight, 59.9 kg (132.1 lbs) (Myers 1991, in Froese and Pauly 2003). Size at maturity is estimated as 81.1 cm (32 in) FL (Froese and Pauly 2003). No estimate of natural mortality rate is available for this species. Fishes serve as its primary prey. But invertebrates also make up a portion of its diet (Myers 1991, in Froese and Pauly 2003).

3.1.2.2.4.3.2 Status

The status of the almaco jack has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.4.4 Crevalle Jack, *Caranx hippos*

3.1.2.2.4.4.1 Biology

The crevalle jack occurs in the Western Atlantic Ocean, ranging as far north as Nova Scotia, southward to Uruguay, including the northern Gulf of Mexico (Robins and Ray 1986). This is a pelagic species, which is generally found over the continental shelf, although young are often found in brackish estuaries. The depth range of this species is 1-350 m (3-1,148 ft) (Smith-Vaniz et al. 1990, in Froese and Pauly 2003). The crevalle jack forms schools, although large individuals may be solitary (Smith-Vaniz et al. 1990, in Froese and Pauly 2003).

Maximum reported size is 150 cm (59 in); maximum weight, 9 kg (20 lbs) (Robins and Ray 1986). This fish is moderately resilient to overfishing, with a minimum population doubling time of 1.4-4.4 years. Its diet is composed of smaller fish, shrimp and other invertebrates (Smith-Vaniz et al. 1990, in Froese and Pauly 2003).

3.1.2.2.4.4.2 Status

The status of the crevalle jack has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.5 Porgies, Sparidae

Sparids that could be affected by the proposed action include the red porgy, jolthead porgy, and knobbed porgy. Many sparids are protogynous (Lindeman et al. 2002), while others have active male and female gonads simultaneously (Nelson 1994, in Froese and Pauly 2003). The spawning season of these fishes is limited (Erdman 1976). The main food source is invertebrates (Lindeman et al. 2000).

3.1.2.2.5.1 Red Porgy, *Pagrus pagrus*

3.1.2.2.5.1.1 Biology

The red porgy occurs in both the Eastern and Western Atlantic Oceans. In the Western Atlantic, it ranges from New York to Argentina, including the northern Gulf of Mexico. Adults are found in deep water near the continental shelf, over rock, rubble or sand bottoms, to depths as great as 280 m (918 ft). Red porgy are most commonly captured at depths of 45-110 m (147-361 ft). Young occur in water as shallow as 18 m (59 ft) (Robins and Ray 1986), and are sometimes observed over seagrass beds (Bauchot and Haureau 1990, in Froese and Pauly 2003).

Maximum reported size is 91 cm (36 in) (Robins and Ray 1986); maximum weight, 7.72 kg (17 lbs) (Bauchot and Haureau 1990, in Froese and Pauly 2003). Potts and Manooch (2002) report that red porgy live for at least 18 years and attain a length of at least 73.3 cm (28.9 in) in the South Atlantic. Spawning occurs from December through May off the southeastern United States, with a peak in January and February (Harris and McGovern 1997). This fish is benthopelagic and eats crustaceans, fish and mollusks (Bauchot and Hureau 1990, in Froese and Pauly 2003).

Based on data collected off the southeast United States from 1995-2000, females first mature at 20.1-22.4 cm (8.0-8.9 in) TL, and at age 0. Size and age at 50% maturity is 28.9 cm (11.5 in) TL and 1.5 years, respectively. Red porgy are protogynous. At 35.1-40.0 cm (13.9-15.9 in) TL, 72% of all individuals collected from 1995-2000 were male; by age 9, 100% of all individuals were males. Researchers observed a much greater percentage of males in smaller classes during recent years, than were observed during the early 1980s (Daniel 2003). In the southeast United States, spawning occurs from December through May, with a peak in January and February (Harris and McGovern 1997). This species feeds on crustaceans, fishes, and mollusks (Bauchot and Haureau 1990, in Froese and Pauly 2003)

3.1.2.2.5.1.2 Status

According to NOAA Fisheries' 2002 report to Congress on the status of fisheries of the United States (NMFS 2003), the South Atlantic stock of red porgy is considered to be overfished, but not to be experiencing overfishing, based on post-SFA definitions of those terms. An overfished condition is defined as a stock size less than 33.3 million kg (7.34 million lbs). Overfishing is defined as a fishing mortality rate in excess of that corresponding to a 35% Static SPR (NMFS 2003). According to the latest assessment; $MSST=2,364$ MT or 5.21 million pounds; $F > F_{MSY}$, $F_{MSY}=0.19$, $F_{2001}/F_{MSY}=0.45$.

3.1.2.2.5.2 Jolthead Porgy, *Calamus bajonado*

3.1.2.2.5.2.1 Biology

The jolthead porgy occurs in the Western Atlantic, ranging from Rhode Island and Bermuda, southward to Brazil, including the northern Gulf of Mexico (Robins and Ray 1986). This fish inhabits coastal waters, from 3 to more than 200 m (10-656 ft) in depth. It can be found on vegetated sand bottoms, but occurs more frequently on coral bottoms. Large adults are usually solitary. This fish is moderately resilient to overfishing, with a minimum population doubling time of 1.4-4.4 years. Maximum reported size is 76 cm (30 in) FL (male); maximum weight, 10.6 kg (23.4 lbs) (Robins and Ray 1986). Estimated size at maturity is 42 cm (17 in). Crabs and mollusks constitute its primary prey items (Robins and Ray 1986).

3.1.2.2.5.2.2 Status

The status of the jolthead porgy has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.2.5.3 Knobby Porgy, *Calamus nodosus*

3.1.2.2.5.3.1 Biology

The knobby porgy occurs in the Western Atlantic Ocean, ranging from North Carolina to Southern Florida, and throughout the Gulf of Mexico (Robins and Ray 1986). This fish is a demersal species, and typically occurs over hard bottom habitat at depths from 7-90 m (23-295 ft) (Robins and Ray 1986). It is moderately resilient to overfishing, with a minimum population doubling time of 1.4-4.4 years (Froese and Pauly 2003). Maximum reported size is 54.4 cm (21.4 in) TL (male/unsexed) (Horvath et al. 1990, in Froese and Pauly 2003); maximum weight, 2.63 kg (5.8 lb) (IGFA 2001, in Froese and Pauly 2003).

Sharp (2001) indicated that knobby porgy live as long as 21 years off the southeastern United States. Few immature fish were sampled by Sharp (2001). Length and age at which 100% of sampled fish had matured were 6 years and 29.8 cm (11.8 in) FL. Male to female sex ratios increased with increasing length and age, and histological evidence of protogyny was found. Females changed sex at 26.5-37.7 cm (10.5-15.0 in) FL and 5-20 years, during any time of year. Females spawned during March-July with a peak during April and May, with an estimated spawning frequency of 1.46 days.

3.1.2.2.5.3.2 Status

The status of the knobby porgy has not been assessed relative to current definitions of overfished and overfishing. The definition of overfished was approved pre-SFA and equates to an SPR level of less than 30%. The definition of overfishing was approved post-SFA and equates to a fishing mortality rate in excess of that corresponding to a 30% Static SPR (NMFS 2003). The Council is currently reviewing these status determination criteria in Amendment 13B to the Snapper Grouper FMP.

3.1.2.3 Other Affected Species

3.1.2.3.1 Finfish and Invertebrates not Included in the Snapper Grouper FMU

Numerous other finfish species not included in the snapper grouper FMU depend on *Oculina* habitat for shelter. And these fishes provide forage for larger predatory species. Red barbier (*Hemanthias vivanus*) and rough tongue bass (*Pronotogrammus martinisensis*) are the two species observed in greatest abundance in the affected environment. Both of these fishes have a strong affinity for the *Oculina* coral thickets and appear to use the branches of the coral to protect themselves from predators. Neither of these species is observed in large numbers in areas devoid of complex benthic habitat. Therefore, it appears as though they depend directly on the health and preservation of *Oculina* coral for their survival.

Other species frequently found in close association with *Oculina* habitat and, thus, likely to be affected by the proposed action, include the blue angelfish (*Holocanthus bermudensis*), spotfin butterflyfish (*Chaetodon ocellatus*), wrasse bass (*Liopropoma eukrines*), tattler (*Serranus*

phoebe), yellowtail reef fish (*Chromis enchrysur*), slippery dick (*Halichoeres bivittatus*), and lizardfish (*Synodus poeyi*). Additionally, strong currents around the *Oculina* Bank are thought to trap fine sand, mud, and coral debris, which support dense populations of mollusks and crustaceans. In turn, those creatures serve as food for many commercial and recreational fishes including red porgy, greater amberjack, and numerous species of snapper and grouper (SAFMC 1998b).

3.1.2.3.2 Protected and Candidate Species

Protected species that may occur within the *Oculina* Bank include various species of whales and sea turtles. In addition, Warsaw grouper and speckled hind are known to occur within the *Oculina* Bank area. Descriptions of the biology and status of the following protected and candidate species can be found in the Biological Evaluation (Appendix C) with additional information located at http://www.nmfs.noaa.gov/prot_res/species/ESA_species.html. The extent to which they may be impacted by the proposed action is briefly described in Section 4.0 and further discussed in Appendix C.

3.1.2.3.2.1 Whales

Listed species of whales that could occur within the closed area include the sperm whale, *Physeter macrocephalus*; blue whale, *Balaenoptera musculus*; fin whale, *Balaenoptera physalus*; sei whale, *Balaenoptera borealis*; humpback whale, *Megaptera noveangliae*; and northern right whale, *Eubaleana glacialis*. Each of these species is classified as “endangered” under the Endangered Species Act (ESA). Species with this classification are determined to be in imminent danger of extinction throughout all or a significant portion of their range.

3.1.2.3.2.2 Turtles

Sea turtles that could occur within the closed area include the Kemp’s ridley turtle, *Lepidochelys kempii*; hawksbill turtle, *Eretmochelys imbricata*; green turtle, *Chelonia mydas*; leatherback turtle, *Dermochelys coriacea*; and loggerhead turtle, *Caretta caretta*. The Kemp’s ridley, hawksbill and leatherback are classified as “endangered” under the ESA. The loggerhead is classified as “threatened”, which signifies it is likely to become endangered in the foreseeable future. The green turtle is also classified as “threatened”, with the exception of the breeding population off Florida which is listed as endangered. Due to the inability to distinguish which population a green turtle is from away from the nesting beach, all green turtles are given “endangered” status where ever they occur in U.S. Atlantic waters.

3.1.2.3.2.3 Candidate Species

In addition to the Warsaw grouper and speckled hind described in Sections 3.1.2.2.2.1.5 and 3.1.2.2.2.1.6, respectively, several “candidate” species are documented to occur in the affected area. These include the dusky shark, *Carcharhinus obscurus*; sand tiger shark, *Odontaspis taurus*; and night shark, *Carcharinus signatus*. A “candidate” species is a species for which reliable information is available that a listing under the ESA may be warranted. There are no mandatory Federal protections required under the ESA for a candidate species. NOAA Fisheries urges voluntary protection of candidate species.

3.1.2.4 Administrative Environment

3.1.2.4.1 The Fishery Management Process and Applicable Laws

3.1.2.4.1.1 Federal Fishery Management

Federal fishery management is conducted under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (M-SFCMA) (16 U.S.C. 1801 et seq.), originally enacted in 1976 as the Fishery Conservation and Management Act. The M-SFCMA claims sovereign rights and exclusive fishery management authority over most fishery resources within the U.S. Exclusive Economic Zone (EEZ), an area extending 200 nautical miles from the seaward boundary of each of the coastal states, and authority over U.S. anadromous species and continental shelf resources that occur beyond the U.S. EEZ.

Responsibility for Federal fishery management decision-making is divided between the U.S. Secretary of Commerce and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary of Commerce (Secretary) is responsible for promulgating regulations to implement proposed plans and amendments after ensuring that management measures are consistent with the M-SFCMA, and with other applicable laws summarized in Section 7.0. In most cases, the Secretary has delegated this authority to NOAA Fisheries.

The South Atlantic Fishery Management Council is responsible for conservation and management of fishery resources in Federal waters of the U.S. South Atlantic. These waters extend from 3 to 200 miles offshore from the seaward boundary of the States of North Carolina, South Carolina, Georgia, and east Florida to Key West. The Council has thirteen voting members: one from NOAA Fisheries; four from the state fishery agencies of North Carolina, South Carolina, Georgia, and Florida; and eight public members appointed by the Secretary. On the South Atlantic Council there are two public members from each of the four South Atlantic States. Non-voting members include representatives of the U.S. Fish and Wildlife Service, U.S. Coast Guard, State Department, and Atlantic States Marine Fisheries Commission (ASMFC). The South Atlantic Council has adopted procedures whereby the non-voting members serving on the Council Committees have full voting rights at the Committee level but not at the full Council level. Council members serve three-year terms and are recommended by State Governors and appointed by the Secretary of Commerce from lists of nominees submitted by State governors. Appointed members may serve a maximum of three consecutive terms.

Public interests also are involved in the fishery management process through participation on advisory panels and through council meetings, which, with few exceptions for discussing personnel matters, are open to the public. In addition, the regulatory process is in accordance with the Administrative Procedures Act, in the form of “notice and comment” rulemaking.

3.1.2.4.1.2 State Fishery Management

The state governments of North Carolina, South Carolina, Georgia, and Florida have the authority to manage fisheries that occur in waters extending three nautical miles from their respective shorelines. North Carolina’s marine fisheries are managed by the Marine Fisheries Division of the North Carolina Department of Environment and Natural Resources. The Marine Resources Division of the South Carolina Department of Natural Resources regulates South Carolina’s marine fisheries. Georgia’s marine fisheries are managed by the Coastal Resources Division of the Department of Natural Resources. And the Marine Fisheries Division of the

Florida Fish and Wildlife Conservation Commission is responsible for managing Florida's marine fisheries. Each state fishery management agency has a designated seat on the South Atlantic Council. The purpose of state representation at the council level is to ensure state participation in Federal fishery management decision-making and to promote the development of compatible regulations in state and Federal waters.

The South Atlantic states are also involved through the ASMFC in management of marine fisheries. This commission was created to coordinate state regulations and develop management plans for interstate fisheries. It has significant authority, through the Atlantic Striped Bass Conservation Act and the Atlantic Coastal Fisheries Cooperative Management Act, to compel adoption of consistent state regulations to conserve coastal species. The ASFMC also is represented at the Council level, but does not have voting authority at the Council level.

NOAA Fisheries' State-Federal Fisheries Division is responsible for building cooperative partnerships to strengthen marine fisheries management and conservation at the state, inter-regional, and national levels. This division implements and oversees the distribution of grants for two national (Inter-jurisdictional Fisheries Act and Anadromous Fish Conservation Act) and two regional (Atlantic Coastal Fisheries Cooperative Management Act and Atlantic Striped Bass Conservation Act) programs. Additionally, it works with the ASMFC to develop and implement cooperative State-Federal fisheries regulations.

3.1.2.4.2 Enforcement

There is a perception by some fishery stakeholders that a lack of enforcement is a major impediment to successful fishery management in the South Atlantic region (The Heinz Center 2000). As discussed below, multiple agencies provide enforcement assets to Federal fisheries concerns in the South Atlantic region.

Both the National Oceanic and Atmospheric Administration, Fisheries, Office for Enforcement (NOAA/OLE) and the United States Coast Guard (USCG) have the authority and the responsibility to enforce South Atlantic Council FMP regulations. NOAA/OLE agents, who specialize in living marine resource violations, provide fisheries expertise and investigative support for the overall fisheries mission. The USCG is a multi-mission agency, which provides at-sea patrol services for the fisheries mission.

Neither NOAA/OLE nor the USCG can provide a continuous law enforcement presence in all areas due to the limited resources of NOAA/OLE and the priority tasking of the USCG. In order to supplement at-sea and dockside inspections of fishing vessels, NOAA entered into Cooperative Enforcement Agreements with all but one of the states in the Southeast Region (North Carolina), which granted authority to state officers to enforce the laws for which NOAA/OLE has jurisdiction. In recent years, the level of involvement by the states has increased through Joint Enforcement Agreements, whereby states conduct patrols that focus on Federal priorities and, in some circumstances, prosecute resultant violators through the state when a state violation has occurred.

The *Oculina* HAPC, including the Experimental Closed Area, is subject to enforcement patrols and investigations, despite logistical issues in enforcing the area. Documented violations in the *Oculina* HAPC from July 1993 through May 2003 include four trawling violations and one possession of rock shrimp. Documented violations during the same time period within the Experimental Closed Area included two cases of fishing for snapper grouper species and one possession of tilefish. One additional case was documented in a nearby area of possession of

prohibited coral. Civil administrative enforcement action was taken against the violators in all nine cases.

To enhance enforcement, the Council has required that all vessels fishing with a limited access rock shrimp permit in the Council's area of jurisdiction use an approved vessel monitoring system. This action was taken through Amendment 5 to the Shrimp FMP and became effective on October 14, 2003. At its March 2003 meeting, the Council approved a motion that its position is that enforcement of the *Oculina* HAPC, including the Experimental Closed Area, is an utmost priority, and that violations of the *Oculina* Experimental Closed Area are egregious and of a high and aggravated matter. Further, the Council requested that NOAA General Counsel revise the penalty schedule to reflect such. At its June 2003 meeting, the Council also approved a motion to develop an updated enforcement plan within one year of the implementation of this amendment (Amendment 13A to the Snapper Grouper FMP).

NOAA General Counsel issued a revised Southeast Region Magnuson-Stevens Act Penalty Schedule in June 2003, which addresses all Magnuson-Stevens Act violations in the Southeast Region, including *Oculina*-related violations. In general, this Penalty Schedule increases the amount of civil administrative penalties that a violator may be subject to up to the current statutory maximum of \$120,000 per violation. NOAA Fisheries also has committed to improve the coordination of enforcement assets in the *Oculina* Experimental Closed Area by assigning a special agent to the area (personal communication, Special Agent-in-Charge Richard Livingston, NOAA Fisheries Office for Enforcement, 6-20-03).

All of these actions are expected to improve compliance with the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area if the preferred alternative proposing to extend those regulations is adopted and implemented.

3.1.2.4.3 Science Underlying the Management of Snapper Grouper Species and the Establishment of the *Oculina* Experimental Closed Area

Numerous scientific studies have provided general information on the biology and life history of snapper and grouper species. This information is summarized in Section 3.1.2.2 for those species potentially affected by this amendment. While this information can be used by scientists to theorize about the response of snapper grouper species to fishing pressure, little is known about the status of most snapper grouper species in the South Atlantic region in relation to defined overfished and overfishing thresholds.

Comprehensive assessments using both fishery dependent and independent data have been conducted for only 5 of the 73 species in the Snapper Grouper FMP, including red porgy, black sea bass, wreckfish, and vermilion and yellowtail snapper. The status of an additional 19 species has been assessed based on limited data, for example, catch-per-unit-effort information. The status of the remaining 48 species — 67% of those included in the FMP — is unknown (NMFS 2003).

These data deficiencies make it difficult for fishery scientists and managers to develop management measures that can be trusted to sustain stocks over time with a high degree of certainty, while attempting to minimize to the extent practicable the adverse socioeconomic impacts of management measures on fishing communities. Successful fishery management requires the ability to estimate the maximum amount of fish that can be sustained over time to balance between these conservation and wise-use mandates.

Protecting snapper grouper species within the *Oculina* Experimental Closed Area from fishing pressure should assist in buffering regional populations from the unintended or unforeseen consequences of fishery management, based on the following three processes: (1) juvenile and adult fish can migrate out of the *Oculina* Experimental Closed Area to populate other suitable habitats; (2) there is potential for fish larvae to be exported from the *Oculina* Experimental Closed Area due to spawning habits, larval duration, and regional current patterns; and (3) changes in fishing regulations over the past decade have decreased fishing pressure in the *Oculina* Experimental Closed Area.

First, there are several examples of the success of no-take marine reserves in potential or actual export of fishery species to adjacent waters over relatively short time periods (see review by Halpern 2003). For example, a large marine reserve in Tasmania exhibited increased densities or sizes of large fishes, various fish species, lobsters, and abalone relative to external reference sites within six years (Edgar and Barrett 1999). Marine reserves in Florida and St. Lucia recently have been shown to enhance fishery landings or fish sizes in adjacent waters (Roberts et al. 2001, and references therein), so there is reason to expect export of fishes from the *Oculina* Experimental Closed Area. Adult Nassau grouper, for example, are known to travel as many as 220 km (120 nm) (Bolden 2000) to and from spawning aggregations.

Research addressing potential spillover effects within the *Oculina* Experimental Closed Area has not yet been conducted and may depend on recovery of fish population densities well above their current low levels. Increases in landings, if and when they are detected, could be due to a combination of increased production and export of larvae as well as density-dependent spillover of juveniles or adults (Roberts et al. 2001).

Second, there is potential for export of fish larvae from the *Oculina* Experimental Closed Area to adjacent waters. Although there is little known about currents directly impacting the *Oculina* Experimental Closed Area, studies conducted just to the south indicate that the Florida Current / Gulf Stream serves to distribute planktonic larvae northward while associated countercurrents and seasonal gyres deliver water masses shoreward and help retain larvae in the vicinity (Ogden 1997; Yeung and Lee 2002).

Research to evaluate the potential for the *Oculina* HAPC to supply snapper and grouper larvae to nursery grounds was recently funded by the NOAA Coral Reef Initiative. Satellite-tracked drifters were released in the reserve during winter and summer 2002 to coincide with spawning seasons of gag, scamp, and deep-water groupers. Drifters were transported northward, therefore there is potential for fish larvae to be supplied to nursery habitats north of the *Oculina* HAPC. A report has been submitted to the SAFMC regarding this project (J. Hare, NOAA National Ocean Service, Beaufort Laboratory, personal communication).

Snapper and grouper larvae are found in plankton collections from the Florida Current south of the *Oculina* Experimental Closed Area (Powell et al. 1989) and from the Gulf Stream and inshore waters north of the *Oculina* Experimental Closed Area (Powles and Stender 1976). Larvae of most coral reef fishes, including snappers and groupers, have an estimated planktonic duration of 1-2 months (McManus and Meñez, in Roberts 1997). For example, planktonic duration is approximately 40 days for gag (Keener et al. 1988; Fitzhugh et al. (submitted)). This duration is long enough to export larvae hundreds of nautical miles northward into the South Atlantic Bight (Roberts 1997).

Third, regulations have been enacted to decrease fishing pressure on snappers and groupers within the *Oculina* Experimental Closed Area and broader HAPC. The marked decrease in grouper abundance between surveys conducted in 1980 and in 1995 (Koenig et al.

2000) indicated that the initial 1984 regulations prohibiting the use of bottom trawls, bottom longlines, dredges, fish traps, and fish pots within the *Oculina* HAPC may not have been effective. But recently, Koenig (2001) reported that sizes of male gag and scamp within the HAPC had increased between surveys in 1995 and in 2001. Consequently, cumulative prohibitions to fishing in the area may be having the desired positive impact on fish stocks.

It must be noted, however, that comparable data are not available for prior or intervening years for either time series. So it is unknown whether the observations were consistent annual increments or the results of variable recruitment. Furthermore, Koenig (2001) found a clear relationship between intact habitat and fish populations, but indicated that approximately 90% of the *Oculina* in the Experimental Closed Area had been destroyed. Therefore, increased abundance of gag and scamp is occurring in only a small portion of the *Oculina* Experimental Closed Area.

Biological response variables such as community density, biomass, and mean organism size increase rapidly in no-take marine reserves (within 5 years) and then remain consistently higher for longer time periods (up to 40 years) when compared to reference areas (Halpern and Warner 2002; Halpern 2003). Results for particular species will depend on life histories. Slower-growing, late-maturing species such as snappers and groupers may take longer to exhibit significant increases in density or fish size. Conversely, heavily fished species are more likely to respond quickly once no-take reserves are put in place. For example, Beets and Friedlander (1999) note that a spawning aggregation closure that included uncommon structurally complex habitat in the U.S. Virgin Islands resulted in larger red hind in general and in more numerous males within seven years.

Thus, there is reason to expect that fish stocks will recover in part due to prohibition of fishing activity in the *Oculina* Experimental Closed Area. However, it must also be realized that most (i.e., 90% (Koenig 2001)) of the habitat in the *Oculina* Experimental Closed area has been destroyed. Since fishes are primarily associated with intact habitat, it will take much longer for stocks to recover in the *Oculina* Experimental Closed Area than it would in a no-take area where the habitat has not been compromised.

3.1.2.4.4 Data collection and Research in the *Oculina* Experimental Closed Area

Acoustic and submersible studies of the *Oculina* Banks date back to the early 1970s. Koenig (2001) describes research conducted prior to the designation of the *Oculina* HAPC in 1984, which provided initial descriptions of the geology of the area; of upwelling and bioerosion; of *Oculina varicosa*, in terms of its growth form and distribution, growth rate, reproduction, and ability to survive transplantation; and of the invertebrate communities associated with *Oculina*. These studies contributed to the South Atlantic Council's decision in 1984 to designate through the FMP for Corals and Coral Reefs a 92-nmi² area in which the use of trawls, dredges, traps, and longlines would be prohibited. This area was known as the *Oculina* HAPC (Figure 1).

In response to information suggesting that fishing on aggregations severely changed the demographics of grouper populations, the Council prohibited fishing for and retention of snapper grouper species within the HAPC in 1994 for a period of ten years. This newly established *Oculina* Experimental Closed Area (Figure 2) was intended, in part, to serve as an experiment to determine the effects of a bottom fishing prohibition on (1) the biological community structure, (2) the reproductive fitness of spawning groups, and (3) the recruitment of fishes to other areas. The Council extended the *Oculina* HAPC in 2000 to cover 300 nm from Ft. Pierce to Cape Canaveral in an attempt to protect additional coral habitat from the impacts of trawls, dredges,

traps, longlines, and anchors (Figure 4). However, the prohibition on fishing for and retention of snapper grouper species continued to apply only within the *Oculina* Experimental Closed Area.

Several studies of the *Oculina* Experimental Closed Area and broader HAPC have been conducted since the prohibition on fishing for and retention of snapper grouper species was implemented in 1994. Researchers deployed submersibles in 1995 to estimate the relative proportion of *Oculina* habitat in areas that had not before been studied (e.g., outside of Jeff's Reef) and to compare the coral habitat and fish populations associated with both natural and artificial structure (Koenig et al. in press). From 1996 to 1999, researchers conducted restoration experiments to evaluate the transplantation potential of *Oculina* (Koenig 2001). And, in 2001, submersible and ROV studies of the broader *Oculina* HAPC were conducted to quantify the amount of living habitat in the area; to estimate the percentage of live relative to dead and destroyed *Oculina* habitat; to compare the abundance of fish populations in the *Oculina* Experimental Closed Area before and after the prohibition on fishing for and retention of snapper grouper species was implemented; to evaluate fish populations associated with the restoration reefballs deployed in 2000; and to initiate the development of a geographic information system (GIS)-based habitat map of the HAPC (Koenig 2001).

In 2003 Harbor Branch Oceanographic Institute conducted a research cruise in and around the *Oculina* Habitat Area of Particular Concern. Among the findings were extensive hardbottom areas with live benthos and fish, several isolated live *Oculina* thickets that were discovered in places that had never been explored previously and extensive high relief areas of *Oculina* pinnacles outside and to the west of the *Oculina* HAPC (John Reed, Harbor Branch Oceanographic Institute). Results from this cruise are still preliminary but a summary of preliminary conclusions can be found in Appendix D.

While these studies have provided valuable data on habitat, fish populations, and restoration efforts within the *Oculina* Experimental Closed Area and broader HAPC, they have not provided conclusive information about the effects that the bottom fishing prohibition has had on the biological community structure, the reproductive fitness of spawning groups, or the recruitment of fishes to other areas. Researchers have found it difficult to make conclusive findings about how the closed area affects snapper grouper species due to continued data gaps, enforcement problems noted in Section 3.1.2.4.2, and the short time period that has passed since the regulation prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area was implemented.

Koenig (2001) reported that, even though 90% of the *Oculina* in the Experimental Closed Area had been reduced to rubble, there had been an increase in fish populations, including spawning aggregations of gag and scamp. Fishes were primarily associated with intact habitat and very few fishes were observed over destroyed *Oculina*. The benefits of the closed area to these long-lived fish species will not be quickly realized. Since *Oculina* is extremely slow growing (1.5 cm/yr), most of the habitat has been reduced to rubble, and fishes are associated primarily with intact habitat, it may take decades before the impacts of the closed area on some populations can be observed (Reed 1981; Koenig 2001).

Opponents of the proposed action commonly cite the current state of uncertainty about the impacts of the *Oculina* Experimental Closed Area as a reason why the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area should not be extended. However, the South Atlantic Council believes that scientific uncertainty should not be used as a reason to relax the regulations at this time.

The purpose of the proposed action is to provide continued protection of snapper grouper populations and associated *Oculina* coral. The Council recognizes that the extent of protection provided to snapper grouper populations and *Oculina* habitat by the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area is unknown. The Council also recognizes that protecting a portion of snapper and grouper populations from the impacts of fishing provides a hedge against the high degree of scientific uncertainty upon which fishery management decisions are based. In addition, the Council believes that it is important to provide the highest level of protection to *Oculina* coral by shielding it from all potential fishery-related impacts.

The preferred alternative adopted by the Council in this amendment would require the Council to review the configuration and size of the *Oculina* Experimental Closed Area three years following implementation of the regulation to extend the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area, and to evaluate what is known about the effects of the *Oculina* Experimental Closed Area ten years after the regulation is implemented.

The Council adopted a motion at its June 2003 meeting to develop an updated research plan within one year of the implementation of this amendment. The research needs identified in this plan will be incorporated into the Operations Plan developed by NOAA Fisheries and the Council each year to the extent that funding permits. Operations Plans identify data collection and research priorities on an annual basis.

The current research plan for the *Oculina* HAPC was developed in 1997 and outlined the following data needs in decreasing order of priority:

- I. Habitat Characterization
- II. Habitat Restoration
- III. Condition of Fish Stocks
- IV. Physical Oceanography
- V. Impact of Closed Area on Spillover of Economically Important Species
- VI. Determine Pre-closure Usage of the *Oculina* Banks

Current collaborators researching the *Oculina* HAPC include the University of North Carolina's National Undersea Research Center, NOAA Fisheries' Panama City Laboratory, the Harbor Branch Oceanographic Institute, Florida State University, and NASA's Kennedy Space Center.

NOAA Fisheries' Panama City Laboratory proposed the following revised Research Plan in July 2003 after reviewing the research conducted since the 1997 Research Plan was adopted. This revised Research Plan would change the priorities and character of the work. Proposed revisions are based on two critical observations.

First, there is much less intact living *Oculina* present within the *Oculina* Banks area than was originally thought; that is, extensive areas have been destroyed. Although there are patches of living *Oculina* in several areas throughout the reserve, all areas examined except Jeff's Reef (about 2 hectares) are damaged to varying degrees. Intact habitat is imperative to the development of natural communities because it forms the foundation and framework of community structure. Without intact *Oculina* habitat there is no chance for recovery of fish and invertebrate populations, regardless of fishing intensity.

Second, illegal bottom fishing has continued within the *Oculina* Experimental Closed Area, despite the 8 cases that have been documented through administrative enforcement action. Until bottom fishing is fully curtailed within the reserve, there can be no experimental evaluation of community structure in general and of fish recruitment and reproduction in particular.

Revised Research Plan for the *Oculina* HAPC (2003)

I. Habitat Restoration

- A. **Priority 1.** Habitat restoration is the highest priority because (1) extensive areas of *Oculina* habitat have been destroyed; (2) recovery of fish and invertebrate populations, and of biodiversity, depends on intact habitat; and (3) essential fish habitat must be restored and conserved according to the M-SFCMA.
- B. **Progress:** A three-year study on *Oculina* reproduction and larval development conducted by Dr. Sandra Brooke of Oregon State University provided some insight into the reproductive biology of *Oculina varicosa*. This study investigated the reproductive mode of *Oculina* as well as its spawning seasonality. However, more information on larval recruitment and survival of new juvenile colonies is needed. Dr. Chris Koenig of Florida State University has deployed different forms of artificial structures with attached live coral fragments each year from 1997-2001 in the *Oculina* HAPC to evaluate survival of coral transplants and recruitment of fish to these habitats. Modules made of pallets of cinder blocks tied together were deployed during 1997-1999, while reef disks and reef balls were deployed during 2001-2002. Some of these structures were explored with a ROV in May 2003. They appeared to attract various fish species including grouper, and the coral transplants were still intact and possibly growing.
- C. **Goals:** The primary goal is to evaluate efficient methods of restoration of destroyed and damaged *Oculina* habitat. Secondary goals are to assess long-term survival of restored colonies and to determine whether restored *Oculina* provides similar habitat functions for fishes as natural *Oculina*.
- D. **Methods:** Field transplant experiments are in progress to evaluate settlement, survival, and growth of transplants and recruitment of fish to the transplant structure.
- E. **Timetable:** Because *Oculina* grows slowly (linear growth is 1.5 cm/yr), restoration is expected to take 15-30 years, and monitoring of the reefballs needs to be done throughout this time period.
- F. **Products:** This work will not only continue the recovery of the *Oculina* HAPC but also may prove valuable in the restoration of other coral habitats.

II. Condition of Fish Stocks

It is important to note that bottom fishing in the *Oculina* HAPC has not stopped even though it has been prohibited since 1994. Because trolling for bottom-associated fish and trawling for rock shrimp, royal red shrimp and calico scallops, damage corals, illegal fishing must be curtailed before meaningful time-series surveys of *Oculina* acreage can be obtained. Ongoing enforcement actions related to the 9 cases and the expanded enforcement effort should help curtail illegal fishing.

- A. **Priority 2.** The vast majority of fishes are associated primarily with living *Oculina* habitat. Thus, knowledge of the locations of living *Oculina* habitat is necessary before comprehensive surveys of fish stocks can be done. In the previous research plan, only one area of intact habitat was known (Jeff's Reef). ROV dives conducted during May 2003 revealed that there are small patches of live *Oculina* in other locations throughout the reserve, though they are extremely sparse.
- B. **Progress:** Manned submersible dives in 2001 and ROV dives in 2001 and 2003 have provided transects within both experimental and control areas to estimate fish species abundance and community structure on various habitat types including live *Oculina*. During the NOAA's 2001 Islands in the Stream mission, passive acoustic monitoring systems (PAMS) units designed by NASA/KSC were deployed offshore and were successful at detecting distinct fish sounds. The PAMS units were modified and re-tested during a cruise in May 2003, again with success in detecting and deciphering fish and vessel sounds. These acoustic systems not only provide information on fish species abundances but also can be useful in monitoring vessel and fishing activity within the HAPC.
- C. **Goals:** The goals are to selectively survey the *Oculina* Banks (including reserve and control sites) for living *Oculina* habitat using a laser line scan system (LLSS), to determine the effectiveness of this instrument in estimating fish population sizes, and to continue a time series of point counts of fish density using underwater video cameras.
- D. **Methods:** LLSS, ROV, trap video, towed video, fishery acoustic system, and manned submersibles will be used when available to survey pinnacle areas throughout the *Oculina* HAPC. Manned submersibles are the preferred method for surveys due to the limited field of view that an ROV provides and due to the high current speeds in the area. Sampling will be in stratified, random designs with emphasis on the south faces of pinnacles because live *Oculina* habitat has been described to be the most abundant there.
- E. **Timetable:** The timetable for this work is the duration of the closure period.
- F. **Products:** A time series of survey data is expected to show both recovery of fish stock sizes (density and increased diversity) and re-establishment of grouper spawning aggregations.

III. Habitat Characterization

- A. **Priority 3.** All other studies can be tied to an accurate map of habitat types in the study area. Because *Oculina* grows so slowly, a long time series may be needed to detect trends in habitat density.
- B. Progress: Multibeam sonar data have been collected for the experimental *Oculina* area and have been incorporated into a GIS database (Brent Manning and Dr. Joanne Halls, University of North Carolina - Wilmington), but only a small portion of the control area has been mapped. This survey provided the first high-resolution (3 meter), three-dimensional bathymetric map of the coral habitat in the *Oculina* HAPC. Data on the distribution of intact and damaged habitat have been collected during ROV and manned submersible dives, but only a fraction of the area has been surveyed.
- C. Goal: To survey the *Oculina* Banks, including the reserve and the control area to the north, to determine the distribution of intact and damaged habitat, and to monitor the expansion of intact coral colonies.
- D. Methods: The most appropriate method for this work is multibeam sonar because it can image high interest areas identified from previous side-scan sonar maps efficiently and can produce high-resolution imaging of benthic habitat condition in digital and video formats. If high-resolution imaging cannot be accomplished with multibeam telemetry, it will be necessary to map living, damaged, and dead *Oculina* using less efficient towed camera or ROV systems.
- E. Timetable: Multibeam mapping of the *Oculina* HAPC would require 10-20 days and should be conducted on a regular basis throughout the closure period in order to observe changes in habitat, especially in areas with substantial amounts of live *Oculina* such as Jeff's Reef.
- F. Products: This project will produce an accurate habitat map of the *Oculina* HAPC from Cape Canaveral south to Fort Pierce Inlet in a GIS format as an overlay of multibeam bathymetry on living and dead *Oculina*.

IV. Physical Oceanography

- A. **Priority 4.** Research is needed to assess transport of fish larvae by currents from spawning sites to distant recruitment areas and to assist in the design and placement of *Oculina* habitat restoration sites. This priority is not higher because research has indicated that transplantation, rather than recruitment, is the more dependable method of coral restoration.

- B. Progress: A study was conducted in 2003 releasing satellite-tracked drifters from four sites in the *Oculina* Experimental Closed Area. Preliminary results from that study are discussed in Section 3.1.1.2.
- C. Goals: To evaluate (1) surface currents for larval fish recruitment into the *Oculina* HAPC and larval fish export to downstream habitats and (2) near-bottom currents and other physical factors for retention of *Oculina* larvae within the reserve and for recruitment to restoration sites.
- D. Methods: Measurements of (1) wind forcing by Coastal Marine Automatic Network (CMAN) stations, (2) water column current structure by acoustic Doppler current profilers (ADCP), (3) current speeds and directions by current meters, and (4) hydrographic and zooplankton surveys.
- E. Timetable: Studies will require several years.
- F. Products: This research will provide estimates of both the contribution of *Oculina* Banks fish populations to larval recruitment along the South Atlantic Bight and larval inputs from upstream spawning areas such as the Florida Keys. In addition, it will provide an evaluation of the physical factors linked to re-colonization of suitable substrate by *Oculina* larvae.

V. Impact of the Closed Area on Spillover of Economically Important Species

- A. **Priority 5.** This will be important when fish populations in the *Oculina* HAPC increase and begin approaching carrying capacity, and when juvenile or adult fish will be more likely to seek less crowded habitats in adjacent unprotected areas. In addition, fishes that reach maturity and spawn on-site may begin supplying larval recruits to downstream habitats.
- B. Progress: None.
- C. Goals: Determine the contribution of fish from the *Oculina* HAPC to local fisheries in adjacent waters.
- D. Methods: *In situ* tagging with break-off tags, acoustic telemetry to follow fish movements, and investigation of natural tags (isotopic or elemental signatures) as indicators of fish movement into and out of the reserve.
- E. Timetable: The timetable for this work is the duration of the closure period.
- F. Products: This research will demonstrate whether or not fishes from the *Oculina* HAPC move to adjacent unprotected habitats and become susceptible to local fisheries.

VI. Determine Pre-closure Usage of the *Oculina* Banks

- A. **Priority 6.** These data are needed to assess the potential economic displacement of fishing effort to other areas. Assess resultant sociocultural impacts of effort displacement.
- B. Progress: Measures of participation and usage exist. Results from satellite imagery work are available.
- C. Goals: Determine the amount and kind of fishing activity displaced by the closure.
- D. Methods: Mail survey, satellite photography analysis.
- E. Timetable: This could be accomplished within one year. However, the longer the period between initial closure (1984) and successive closures (1994, 2004), the less likely that an accurate estimate of effort displacement will be obtained.
- F. Products: Information on the impacts of closure on fishermen.

3.2 Description of the Fishery

3.2.1 Fishing Methods

3.2.1.1 Recreational Fishery

Recreational fishing for species in the snapper grouper complex or “bottom fishing” occurs throughout the South Atlantic region. Generally recreational fishing for snapper grouper is done with vertical hook and line, either electric or manually operated reels. For species in the snapper grouper complex spearfishing is allowed (without the use of rebreathers). Powerheads are also allowed except where prohibited in special management zones (SMZs) and off the coast of South Carolina.

In the *Oculina* Experimental Closed Area fishing for species in the snapper grouper complex has been prohibited since 1994, however this area is very important to the recreational fishery for trolling for pelagic species such as dolphin, wahoo, and sailfish. In 1998 the Council went out to public hearing with a proposal to prohibit all fishing in the *Oculina* Experimental Closed Area in order to improve enforcement of the closed area. The Council received overwhelming opposition to the idea based on the importance of this area to the recreational troll fishery for pelagic species.

When fishing for these species, boats can troll up to eight lines from the boat with the use of outriggers. In addition to using a traditional rod and reel set up, many people fish for pelagic species using downriggers and planers. A downrigger is a unit that is fixed to the gunwale of the boat. The device allows the fisherman to put his line and bait at a specified depth. A line is run from the fishing rod through a release clip to the bait. A line with a weight (ranging anywhere from 1-20 pounds, but averaging around 8) from the downrigger is attached via the release clip. The line is then fed out to the desired depth. When a fish strikes the line, the weighted line is released and the fishing line comes to the surface so the fish can be fought. Planers work similar to the downrigger in that they allow fishing at different depths. A planer is generally a piece of metal that is fashioned into a shape that allows it to dive to a depth ideal for fishing given the conditions. The depth at which the planer is fished is determined by the speed of the boat and the length of the line put out. Like the downrigger system, when a fish is on the line, the line with the planer is released and the fishing line comes to the surface to fight the fish and the planer line is retrieved separately. Recent articles in sportfishing magazines have focused on trolling for grouper using planers and downriggers, so it is possible for bottom fish to be caught with this method. However, planers and downriggers are mostly used for trolling for pelagic species. In addition, some fishermen fishing for deep water species modify gear by increasing weight size to 16 ounces or over on deep drop rigs or use large jigs alone or tipped with bait. Some fishermen have replaced traditional monofilament with low diameter braided line coupled with almost invisible fluorocarbon leaders increasing efficiency at reaching depths when drift fished or motoring and deep dropping over ledges, mounds or other deep structures.

3.2.1.2 For-Hire Fishery

The for-hire fishery includes headboats and charter boats. Headboats are boats that can carry as many as 40-80 people that stop and anchor over hardbottom or wrecks to fish, usually fishing for sea bass, triggerfish, red snapper, and groupers. The length of headboats runs from about 60 to over 80 feet. The charge for a day of fishing can range from \$40-\$60 per person and all bait, tackle, and instruction are included. Although the reels are not attached to the vessel as with most commercial hook and line snapper grouper fishing their fishing methods are similar to the “getting up and down” method that is described in the commercial section below.

The charter boat fishery is somewhat more diverse than the headboat fishery in depths fished, species targeted, and boats and gears used. Charter boats used to fish for snapper grouper

species can range in size from 25 feet to over 50 feet. Boat sizes will vary depending on location along the South Atlantic coast. Most charter fishing is done with hook and line (hand held electric or manual reels) although in Florida some charter companies offer to take clients spearfishing. Both live and cut bait is usually used. Charter vessels can either be in-board or out-board, diesel or gas powered. The charge for a full day charter fishing trip can range in cost but usually averages around \$1,000 and around \$600 for a half-day. Charter boats that are targeting bottom fish tend to fish in the range of 10 – 40 miles offshore but can operate closer to shore along southeast Florida.

3.2.1.3 Commercial Fishery

There are four legal methods of harvest in the commercial snapper grouper fishery. Species can be harvested by black sea bass pot, vertical line (handline, hydraulic, or electric), longline, and by diving (utilizing powerheads or spears except where prohibited in the EEZ) . An economic survey of commercial snapper grouper vessels along the South Atlantic coast done in the mid-nineties found that “average length of boats was 32.7 feet, with nearly all sampled boats being less than 50 feet in length. Boats with bottom longlines tended to be the longest, had the most powerful engines, the greatest fuel capacities, and the largest holding boxes for fish and ice. Boats with vertical lines, especially in the southern area, tended to be the shortest, had the least powerful engines, the smallest fuel capacities, and the smallest holding boxes for fish and ice” (Waters et al. 1997).

The **vertical line** sector of the commercial fishery operates throughout the Council’s area of jurisdiction from the North Carolina/Virginia border to the Atlantic side of Key West, Florida. According to NMFS Logbook data there were 15,302 trips reported in 2001 in which hook and line gear was identified as the main gear for that trip. This fishery takes place in about 13 to 110 fathoms (78-660 feet) of water both during day and night. There are various fishing methods among the hook and line fishery. The majority of hook and line fishermen use either electric or hydraulic reels known as “bandit” gear due to its resemblance to one-armed bandit machines used in casinos. Boats typically have 2-4 bandit reels attached. When using bandit gear fishermen tend to either “sit and soak” or “get up and down”. When fishermen sit and soak they are fishing live or dead baits with circle or “jap” hooks and letting their rigs (generally a 20-40 foot leader with 2 hooks) soak near the bottom for anywhere from 15 minutes to an hour. Fishermen will use this method to catch grouper and some snapper such as red snapper in about 13-50 fathoms (78-300 feet) of water. Another method is often called “getting up and down” where fishermen are actively fishing 2-3 straight hooks per reel with cut bait. When fishermen fish this way the line is being tended constantly and brought up to the surface as soon as a bite is felt. Most vermilion snapper, triggerfish, and porgies are caught this way. Fishermen also fish for grouper using this method but with bigger hooks. When fishing for deepwater snapper grouper species (primarily targeting snowy grouper, but also catching large red porgy, grey tilefish, Warsaw grouper, and speckled hind) in 50-100 fathoms (300-600 feet) of water they bait multi-hook rigs (with anywhere from 2-10 circle hooks) with squid, Boston mackerel, or other cut bait. In South Florida there is also a yellowtail snapper fishery. This is mostly a day boat fishery. Fishermen chum for yellowtail which are caught on handlines with “j” hooks and then chill-killed for high quality.

Black sea bass pots are allowed north of Cape Canaveral, Florida, although the majority of the fishery takes place off North Carolina and northern South Carolina. According to NMFS Logbook data there were 1,054 trips in 2001 in which sea bass traps were reported as the main

gear. Sea bass traps are fished in two different ways. Some fishermen sight fish, or “fish the fish” seen on their color machines. They fish around 20-25 traps that soak for anywhere from 30 minutes to 3 hours and are hauled 3 or so times a day. The majority of these fishermen take their traps back to shore with them every night. Others scatter their traps and set them where there is hard bottom, usually letting them soak over night. These traps generally stay in the water for extended periods of time. Black sea bass traps are baited with fish such as menhaden, herring, and Boston mackerel.

The Snapper Grouper FMP allows **bottom longlining**, which must be conducted in waters of 50 fathoms (300 feet) or more, north of St. Lucie Inlet, Florida and for species other than wreckfish. According to NMFS Logbook data there were 714 trips in 2001 in which longlines were reported as the main gear. Effort is mostly off Florida and the Carolinas. Off Florida, most trips are conducted 20 to 30 miles offshore in waters 600 to 900 feet deep. The primary areas are off New Smyrna Beach, the Cape Canaveral area, and off Sebastian Inlet/Fort Pierce area, all on the Florida east coast. Each area has probably less than a dozen vessels currently active in longlining. In general, the mainline is 1/8 inch stainless steel or galvanized cable. The leader length is approximately 2 to 2.5 feet. The length of the mainline ranges between 1 and 6 miles though most average around 3 to 4 miles with a hook about every 50 to 60 feet. They use a circle hook sized at about 1.5 to 2 inches. Longliners generally set out with the current (running up to 3.5 knots) and pull up immediately after the set is laid out. Since they are usually going against the current while pulling up the gear, hauling back can take anywhere from 2 to 3 hours. In general, they may average 2 to 3 sets a day. Length of trip depends on weather and catch rate but is probably a few days or less. The bait is chunk bait and the target species is golden tilefish.

Off South Carolina there are probably about 5 longliners targeting snowy grouper or tilefish. Off North Carolina there are less than 10 on average primarily targeting snowy grouper, which they fish outside of 100 fathoms (600 feet). A small tilefish fishery has developed off the northern part of North Carolina but most likely would only increase the vessel number by 1 or 2. The primary type of gear used by the longliners is cable, though the tilefish fishery may use monofilament as this fishery is conducted primarily in mud whereas the snowy grouper fishery is over hard bottom. The primary bait in the tilefish fishery is fresh squid but in the grouper fishery a variety of cut bait is used. The average mainline is 3 miles and approximately 300 to 400 hooks are used. As with the Florida fishery, circle hooks are used. The leader length ranges from 2.5 to 4 feet. On average, the soak time is 30 minutes with 2 sets a day. The sets are conducted during the day although the grouper fishery may do a nighttime set or 2 since, unlike the tilefish, the groupers feed after dark. The length of the trip may vary though generally does not last longer than 3 days.

Fishing for snapper grouper species has been prohibited within the *Oculina* Experimental Closed Area since 1994 when Snapper Grouper Amendment 6 (SAFMC 1993) went into effect. At the time of the closure there was effort directed toward snapper grouper species in the closed area using bandit and longline gear (longline gear was being used illegally in this area). At public hearings for Amendment 6 fishermen testified that the proposed area was where they concentrated their fishing effort, albeit illegally. Due to inaccurate reporting of catch location and the extremely large logbook grid area, this was not supported by the logbook or Florida trip ticket data.

3.2.2 Economic Description of the Fishery

An economic description of the fishery forms part of the Regulatory Impact Review as required under E.O. 12866 and is also a requirement of the National Environmental Policy Act (NEPA). The continuation of the prohibition on fishing for snapper grouper species in the *Oculina* Experimental Closed Area (the closed area) will provide a hedge against the high degree of scientific uncertainty associated with the status of snapper grouper species throughout their range and reduce the possibility that these populations will fall below sustainable levels. Thus, the affected environment potentially encompasses the entire snapper grouper fishery and not just that portion that traditionally harvests snapper grouper species in or near the closed area. The following description, therefore, contains an overall description of the various sectors in the entire South Atlantic snapper grouper fishery.

Even though the ban on anchoring will still remain in effect if the current prohibitions expire, there will be foregone use benefits (costs) from continuing the prohibition on fishing for snapper grouper species in the closed area. Commercial fishermen who “motor fish” and recreational fishermen and charter operators who “deep troll” using planers (Section 3.2.1.1 and Section 3.2.1.2) could fish in the closed area without the need to anchor their vessels. Information from the public hearing held on June 16, 2003 and other sources indicated that there is interest on the part of some commercial fishermen (in the hook and line category) and charter operators who dock their vessels along the Florida Atlantic coast between Cape Canaveral on the northern end to West Palm Beach on the southern end (the area of interest) to fish in the closed area. Also, it is expected that some of the private recreational anglers who deep troll for snapper grouper species and who launch their vessels from sites in the “area of interest” would fish in the closed area should it reopen.

The following discussion will start with a typology and definition of economic benefits that pertain to the snapper grouper fishery in the South Atlantic and to the management measure under consideration. This is followed by a historical account and current description of the snapper grouper recreational and commercial fisheries in the South Atlantic, the east coast of Florida and where data are available relevant to the “area of interest.” In addition, a comparison of effort, catch, harvest, and ex-vessel revenue data on the east coast of Florida prior to and after the prohibition on snapper grouper fishing in the *Oculina* Experimental Closed Area is provided. Average annual statistics during the years 1991 to 1993 (prior to the closure) are compared to averages during the years 1995 to 1997 (after the closure). The purpose of this comparison is to identify, if possible, the impact of the prohibition that went into effect in June of 1994. This period of comparison was selected since a longer time horizon would include the effect of additional regulations that have been imposed since the original closure. However, it should be noted that observed differences cannot solely be attributed to the closure since other regulations were implemented in 1994 and during the period after the closure. Furthermore, other factors such as stock abundance and market conditions play a role in the levels of catch and effort for all time periods.

3.2.2.1 Description of the Economic Benefits

The benefits (and opportunity costs) that marine resources (assets) generate can be broadly classified into use and non-use values. Use values can be further subdivided into direct use, indirect use and option values. Direct use values capture the benefits from using the resource. These direct use benefits can be either consumptive (e.g., capture fisheries, recreational fisheries) or non-consumptive (e.g., aesthetics, education and research opportunities). Another category of use values is indirect use value which captures the functional benefits of the asset. These indirect uses are mainly comprised of ecosystem services that support commercial and

recreational fisheries and protect critical habitats and biodiversity. A third type of use value is option value. Option value refers to the value that arises from maintaining the option to use an environmental asset in the future. This value captures both direct and indirect use values and may include any future value of information derived from not using the asset. In the case of the *Oculina* Experimental Closed Area, because of the uncertainty regarding future availability of this asset (due to the damage caused by past fishing), society may be willing to pay a risk premium (i.e., close the area) to keep the option of future indirect and direct benefits available.

Non-use values capture those values that are not connected to the use of the asset. Within the non-use value category, economists recognize bequest and existence values. Bequest value captures what society is willing to pay (or benefits willing to forgo) to ensure future generations enjoy access to environmental assets. Existence values, on the other hand, reflect society's willingness to pay (or willingness to forgo) to ensure the continued existence of environmental assets (i.e., protection of the unique coral habitat). Additionally, it is useful to mention that there are quasi-option values. Quasi-option values refer to value that arises from not undertaking irreversible decisions, thus, maintaining options for future use of the asset. Non-use benefits are also expressed in dollar values. Provided all other conditions remain the same (*ceteris paribus*), it is expected that this value should increase (at a decreasing rate) if stocks improve, there is an increase in biodiversity, enhanced aesthetics, or improved habitat quality.

Determining the value of many environmental assets is a complex endeavor since these assets are not traded in markets. In these cases, sophisticated non-market valuation techniques are required. Such techniques have yet to be applied to determine the total economic value of the *Oculina* Experimental Closed Area. However, studies have been conducted in other coral reef areas and may be used to infer the potential range of values for this area. Various use and non-use values from different coral reefs are presented in Table 5a to give readers a sense of the magnitudes of these different benefit estimates. Readers should be warned, however, that these values cannot be directly extrapolated to the *Oculina* Experimental Closed Area without a careful benefits transfer analysis.

Table 5a: Use and non-use values for coral reefs. Source: Gustavson and Huber (2001).

Description of the Benefit	Results	Reference
Direct use value (Corals in SE Florida, including Miami-Dade, Broward, Monroe and Palm Beach counties)	US\$ 635.8 million	Hazen and Sawyer (2001)
Indirect use value Coastal Protection	Replacement costs: US\$ 22 billion based on construction of concrete tetrapods breakwaters to replace 22,000 Km ² of reef protection	McAllister (1991)
Non use value of coral reef habitat (Curaçao coral reefs)	WTP (willingness to pay) for tourists ranged from US\$ 0.26-5.82 and for locals ranged from US\$ 0.19-0.25	Spash et al. (1998)
Option value (Galapagos National Park, Ecuador)	US\$ 120/ha/yr. Conservation values include habitat value, recreation,	de Groot (1992)
Existence and option value (Great Barrier Reef, Australia)	A\$ 45 million/year (or A\$ 4 per visit) to ensure that the Great Barrier Reef is maintained in current state	Hundloe et al. (1987)
Biodiversity Maintenance	US\$ 4.9/ha/yr	de Groot, 1992

3.2.2.2 The Recreational Fishery

There is a substantial recreational fishery in the South Atlantic and the following description is separated into the private recreational and for-hire sectors. The former includes anglers fishing from shore and from private/rental boats. The for-hire recreational sector is divided into the charterboat and headboat sectors. Where possible, catch, effort and economic data that pertain to snapper grouper fishing are presented. It should be noted that catch and effort data from the MRFSS (Marine Recreational Fisheries Statistics Survey) does not include Monroe County and the Florida Keys.

It was not possible to determine the number of anglers who targeted and/or caught snapper grouper species in the South Atlantic states. Estimates are available from the MRFSS on the total number of recreational anglers who participated in all saltwater recreational fisheries by all modes (charter, shore and private/rental boat). In North Carolina and Florida the number of people participating in saltwater recreational fishing was variable but there was an increase from 1981 to 2002. On the east coast of Florida, during 1981, just over 1 million anglers went saltwater fishing. In comparison, 2.27 million recreational anglers participated in saltwater fishing during 2002 (Table 5b) on the east coast of Florida.

Table 5b. Number of anglers participating in all saltwater fisheries by state. Source: MRFSS, NOAA Fisheries Web Site (www.nmfs.noaa.gov/recreational.htm)

Year	East Florida	North Carolina	Georgia	South Carolina
1981	1,096,720	592,471	108,678	242,529
1982	1,250,740	1,100,775	149,677	410,834
1983	1,705,631	1,296,132	159,395	413,146
1984	2,008,047	1,091,596	135,011	688,424
1985	1,896,663	932,535	114,265	497,704
1986	1,924,095	719,892	145,887	440,980
1987	1,743,878	1,155,358	190,248	601,836
1988	1,617,551	1,357,125	135,942	761,173
1989	1,748,896	1,207,817	102,258	428,462
1990	1,557,942	1,345,202	215,669	468,994
1991	2,090,780	1,119,139	283,374	570,800
1992	2,142,617	1,284,730	170,124	479,374
1993	1,941,328	1,366,707	179,547	511,891
1994	2,166,595	1,479,870	323,243	579,948
1995	2,105,039	1,310,468	314,293	436,458
1996	1,881,152	1,182,560	224,473	484,305
1997	1,902,889	1,355,123	112,058	537,003
1998	1,819,473	1,090,798	115,157	638,790
1999	1,510,281	1,293,051	111,192	413,821
2000	2,287,673	1,921,780	219,355	509,507
2001	2,649,299	2,006,661	212,215	481,426
2002	2,268,001	1,755,283	153,358	364,652

Note: Data for the east coast of Florida do not include the Florida Keys. Also, these numbers are not additive across states since an angler can fish in multiple states.

These anglers targeted a variety of species and it is not possible to separate the number of anglers who targeted and/or caught snapper grouper species from this dataset. Effort in the snapper grouper fishery can be examined, however, by evaluation of the number of angler trips that targeted snapper grouper (regardless of whether they caught one of the snapper grouper species) and the number of angler trips that caught a snapper grouper species (regardless of whether they targeted the species or not). Target effort provides a measure of demand and intent and includes both successful (the species was caught) and unsuccessful (the species was not caught) trips. Catch effort includes both successful target trips and incidental harvest trips. Although target demand would be expected to be influenced by species availability, since most anglers do not report targeting any specific species, changes in the number of catch trips may be an indicator of increasing or decreasing stock abundance.

Recreational Fishing Trips

The following discussion on snapper grouper catch effort does not include the headboat sector since trip level data are not available for this sector. Discussion of effort in the headboat sector is limited to a discussion of angler days (see below). For the South Atlantic, the total number of trips where snapper grouper species were caught fluctuated between two and three million trips annually, and there appears to be an increasing trend from 1986 to 2002. Overall, snapper grouper catch trips comprised an average of 16% of all saltwater fishing trips during the period 1999 to 2002 (Table 6a).

Most snapper grouper catch trips are taken by either private/rental or shore modes, and for the private/rental mode there appears to be an increasing trend during 1986 to 2002 (an increase from 1.2 million trips to 1.7 million trips). During this period, the charter sector displayed a lot of fluctuation with no discernible trend (Table 6a). In terms of catch trips, it appears that snapper grouper species are relatively more important for the charter and private/rental modes as compared to the shore mode (Table 6a). An angler's choice of mode will be somewhat dependent on the species targeted, its location and the cost of fishing. However, if the mode choice occurs first, this can limit species availability and, hence, target selection.

Table 6a. Recreational fishing trips where snapper grouper species were caught in the South Atlantic by mode. Source: MRFSS, NOAA Fisheries, Washington DC.

Snapper/Grouper Trips					Percent of Total Recreational Trips			
Year	Charter	Private/Rental	Shore	Total	Charter	Private/Rental	Shore	Total
1986	108,237	1,196,254	1,137,973	2,442,464	14%	18%	15%	16%
1987	66,933	1,447,983	481,753	1,996,669	10%	19%	6%	12%
1988	154,899	1,279,810	884,198	2,318,907	16%	16%	9%	12%
1989	115,222	1,392,740	751,515	2,259,477	16%	20%	9%	14%
1990	56,989	1,089,812	765,099	1,911,900	13%	17%	11%	14%
1991	56,037	1,422,565	1,071,397	2,549,999	13%	20%	11%	15%
1992	96,306	1,325,828	841,608	2,263,742	22%	20%	10%	15%
1993	88,258	1,273,144	781,629	2,143,031	13%	19%	8%	13%
1994	140,609	1,683,373	1,048,001	2,871,983	17%	20%	10%	14%
1995	130,384	1,470,433	941,694	2,542,511	14%	19%	9%	13%
1996	116,004	1,346,813	762,567	2,225,384	12%	18%	9%	13%
1997	102,690	1,496,144	835,794	2,434,628	11%	18%	9%	13%
1998	88,784	1,468,103	928,558	2,485,445	11%	19%	11%	15%
1999	145,794	1,571,870	817,210	2,534,874	22%	23%	12%	18%
2000	83,692	1,922,064	1,215,175	3,220,931	16%	21%	12%	16%
2001	97,245	1,744,501	1,172,995	3,014,741	20%	18%	10%	14%
2002	97,389	1,706,881	888,218	2,692,488	22%	21%	10%	15%

*The data for charter mode and total trips were presented from 1986 since earlier years included headboat effort.

In the South Atlantic, during the latest three years (2000 to 2002) an average of 85% of all snapper grouper catch trips were either inland or inshore of three miles (Table 6b). For the period 2000-2002, the average number of all snapper grouper catch trips in the South Atlantic was 2,976,053 (Table 6a), and the average number of snapper grouper catch trips in inland areas and inshore of 3 miles was 2,535,725. During the period 1986 through 2002 there has been an

increasing trend in the number of snapper grouper catch trips in inland areas and in the ocean less than three miles from shore (Table 6b). Within the Exclusive Economic Zone (EEZ) the number of snapper grouper catch trips increased until 1990, after which there was general fluctuation but no distinct trend. Some of the factors that determine the location of a recreational fishing trip are the species targeted, the cost of the trip, the angler's available time and the mode of fishing.

Table 6b. Recreational fishing trips where snapper grouper species were caught in the South Atlantic by area. Source: MRFSS, NOAA Fisheries, Washington DC.

Snapper Grouper Trips				Percent of Total Recreational Trips in area		
Year	Inland	Ocean <=3 miles	Ocean >3 miles	Inland	Ocean <=3 miles	Ocean >3 miles
1986	1,033,091	1,027,450	381,923	13%	21%	18%
1987	971,401	615,843	409,425	11%	11%	18%
1988	970,634	929,824	418,449	11%	13%	15%
1989	932,669	834,002	492,806	13%	13%	18%
1990	882,940	758,217	270,743	15%	13%	15%
1991	1,192,552	1,004,156	353,291	15%	13%	17%
1992	1,036,480	845,900	381,362	16%	12%	19%
1993	1,048,201	752,610	342,220	14%	10%	17%
1994	1,348,554	1,070,659	452,770	16%	11%	19%
1995	1,176,415	959,546	406,550	15%	11%	17%
1996	970,555	892,454	362,375	14%	11%	16%
1997	1,138,809	941,455	354,364	16%	11%	16%
1998	1,222,448	955,612	307,385	18%	12%	15%
1999	1,358,832	775,877	400,165	22%	12%	21%
2000	1,633,254	1,124,051	463,626	19%	12%	19%
2001	1,521,446	1,034,485	458,810	17%	10%	19%
2002	1,358,311	935,628	398,549	19%	11%	20%

*The data prior to 1986 were not presented since earlier years included headboat effort which was not measured in subsequent years.

Estimates of effort in the headboat sector are limited to estimates of the number of angler days that are taken on headboat vessels. An angler day is a standardized measure of 12-hour fishing effort across the entire sector that incorporates the partial day and full day service behavior of the fleet. These estimates incorporate all effort in the sector and have no species target dimension. However, it is expected that a large portion of these trips target snapper grouper species due to the bottom-fishing nature of the headboat service. Since 1987, there has been a declining trend in total headboat trips in the South Atlantic (Table 6c).

The headboat effort on the east coast of Florida comprises a large portion (nearly or greater than half) of the headboat trips in the South Atlantic. Here again, there was a steady decline from 1987 to 2001, similar to that of total headboat effort. The number of trips peaked at 250,867 in 1987 and steadily declined to 115,729 in 2001. This represents an overall decrease of 54% (Table 6c).

Table 6c. Estimated headboat angler days for the U.S. South Atlantic. Source: The Headboat Survey, NOAA Fisheries, SEFEC.

Year	North East Florida to Miami	Total	% of Total Trips in Florida
1981	226,816	376,927	60%
1982	221,519	387,611	57%
1983	213,142	367,406	58%
1984	217,680	385,172	57%
1985	213,615	378,191	56%
1986	241,617	415,475	58%
1987	250,867	447,108	56%
1988	225,133	420,663	54%
1989	235,864	418,250	56%
1990	245,240	423,286	58%
1991	212,876	388,940	55%
1992	197,854	367,491	54%
1993	165,514	344,214	48%
1994	178,585	342,704	52%
1995	150,182	312,742	48%
1996	138,350	289,924	48%
1997	114,302	270,602	42%
1998	103,734	254,082	41%
1999	120,414	250,907	48%
2000	133,869	253,863	53%
2001	115,729	244,429	47%

A breakdown of the number of snapper grouper catch trips on the east coast of Florida is provided in Table 7a. The total number of snapper grouper catch trips has been on a slightly increasing trend since 1986 and currently comprises about 22% of all saltwater recreational trips on the east coast of Florida (Table 7a). Most of these trips were either shore trips or private/rental boat trips. For these two modes the same increasing trend was observed as for the total number of trips (Table 7a). The charter sector exhibited a lot of fluctuation and no distinct pattern could be identified. This mode was the least important, and charter trips did not exceed 5% of all snapper grouper catch trips in any one year (Table 7a).

Table 7a. Recreational fishing trips where snapper grouper species were caught on the east coast of Florida by mode. Source: MRFSS, NOAA Fisheries, Washington DC.

Snapper Grouper Trips					Percent of Total Recreational Trips			
Year	Charter	Private/Rental	Shore	Total	Charter	Private/Rental	Shore	Total
1986	72,236	901,198	988,865	1,962,299	16%	21%	20%	20%
1987	43,628	1,073,779	370,841	1,488,248	10%	21%	7%	14%
1988	88,987	932,012	695,595	1,716,594	14%	18%	12%	15%
1989	55,682	1,115,948	662,882	1,834,512	12%	23%	12%	17%
1990	30,499	807,053	655,904	1,493,456	11%	20%	17%	19%
1991	33,109	1,162,682	981,521	2,177,312	13%	25%	16%	20%
1992	37,844	1,042,236	755,840	1,835,920	18%	25%	16%	20%
1993	36,143	990,651	682,243	1,709,037	9%	24%	13%	18%
1994	69,757	1,355,801	903,577	2,329,135	16%	25%	15%	20%
1995	30,852	1,222,373	838,644	2,091,869	6%	23%	14%	18%
1996	36,191	1,140,036	690,326	1,866,553	8%	23%	14%	18%
1997	41,907	1,222,730	736,664	2,001,301	9%	22%	14%	18%
1998	49,875	1,221,440	833,421	2,104,736	12%	25%	17%	21%
1999	106,371	1,366,431	723,063	2,195,865	29%	33%	20%	27%
2000	64,600	1,527,646	1,078,098	2,670,344	23%	27%	20%	23%
2001	66,093	1,404,291	1,056,936	2,527,320	26%	23%	17%	20%
2002	72,638	1,420,184	804,231	2,297,053	34%	26%	17%	22%

Most snapper grouper catch trips on the east coast of Florida occur inland and in areas inside of three miles from shore. Even though there was a fair amount of interannual random variability, there appears to have been an increasing trend in the number of trips in these areas (Table 7b). This same fluctuation was observed for trips in the EEZ with no discernible trend. After 1999 about 14% of all snapper grouper catch trips occurred in federal waters (Table 7b). Furthermore, in 2002, about 20% of all snapper grouper private/rental trips in Florida occurred in the EEZ while the relative proportion is 50% for the charterboat sector.

Table 7b. Recreational fishing trips where snapper grouper species were caught on the east coast of Florida by distance from shore. Source: MRFSS, NOAA Fisheries, Washington DC.

			Ocean >3 miles		
Year	Inland	Ocean <=3 miles	Charter	Private/Rental	Total in the EEZ
1986	777,903	891,947	67,854	224,595	292,449
1987	724,072	486,296	30,972	246,908	277,880
1988	780,666	688,778	43,422	203,728	247,150
1989	737,451	729,374	17,729	349,958	367,687
1990	712,679	607,689	22,681	150,407	173,088
1991	1,021,550	891,942	16,680	247,140	263,820
1992	846,942	726,345	18,546	244,087	262,633
1993	869,639	640,586	11,240	187,572	198,812
1994	1,069,760	938,973	50,809	269,593	320,402
1995	988,200	836,214	13,418	254,037	267,455
1996	819,104	806,374	17,185	223,890	241,075
1997	1,005,393	753,429	30,747	211,732	242,479
1998	1,052,517	819,872	32,114	200,233	232,347
1999	1,226,929	630,293	64,225	274,418	338,643
2000	1,355,935	943,071	42,662	328,676	371,338
2001	1,293,452	879,895	39,236	314,737	353,973
2002	1,167,037	814,352	36,536	279,128	315,664

There were more snapper grouper catch trips in 1995 compared to 1993. This was observed for all modes in the EEZ and all areas fished (Tables 7a and 7b). A comparison of the snapper grouper trips prior to the prohibition (1991-1993) and after the prohibition (1995-1997) on snapper grouper fishing in the closed area is presented in Table 7c. This prohibition became effective in June 1994 and thus the 1994 snapper grouper effort estimates are not a good reflection of the effect of this management regulation. Apart from the shore fishing mode, the number of snapper grouper catch trips was slightly higher during the period after the closure as compared to the period prior to the closure (Table 7c). In fact, there was an increase of 79,151 snapper grouper trips on the East Coast of Florida during the years after the closure (Table 7c). There was a slight increase in trips in the EEZ in the later time period as compared to the period prior to the closure (Table 7c).

Table 7c. Comparison of snapper grouper effort on the east coast of Florida prior to and after the prohibition of snapper grouper fishing in the *Oculina* Experimental Closed Area. Source: MRFSS, NOAA Fisheries, Washington DC.

Area or Mode	Average number of trips 1991, 1992 & 1993	Average number of trips 1995, 1996 & 1997
Charter	35,699	36,317
Private/Rental	1,065,190	1,195,046
Shore	806,535	755,211
Total snapper grouper trips	1,907,423	1,986,574
Inland	912,710	937,566
Ocean < 3 miles	752,958	798,672
Ocean >3 miles - Charter	15,489	20,450
Ocean >3 miles - Private/Rental	226,266	229,886
Total Trips in the EEZ	241,755	250,336

Recreational Snapper Grouper Harvest

While harvest is only one indicator of quality and value of the recreational experience, a discussion of harvest is, nevertheless, relevant to a description of the recreational fishery. The weight of recreational snapper grouper species harvested was on a decreasing trend from 1986 to 1998 (Table 8a). Catches declined by 54% (7.8 million pounds). Thereafter, landings were on an increasing trend and climbed to 11.1 million pounds in 2001 (Table 8a). A similar trend was observed in the private recreational sector (private/rental boat mode and shore mode) which accounted for anywhere from 42% to 63% of total snapper grouper landings. Harvest by the headboat sector increased from 1986 through 1988 then declined to about 1.4-1.6 million pounds through 1995. Catches then declined to just under 1 million pounds. Landings in the charter sector fluctuated considerably but were certainly lower in 2000 and 2001 compared to earlier years (Table 8a).

Table 8a. Annual landings (pounds) of snapper grouper species in the South Atlantic recreational fishery by sector. Source: NOAA Fisheries, SEFSC.

Year	Charterboat	Headboat	Shore and Private/Rental Boat	Harvest not Separated by Mode*	Total
1986	2,636,339	1,487,966	8,099,955	2,374,554	14,598,814
1987	1,246,701	1,850,982	5,377,642	3,437,523	11,912,848
1988	2,582,802	1,962,009	7,899,140	4,093,467	16,537,418
1989	1,233,041	1,530,780	5,168,711	4,235,246	12,167,778
1990	1,766,424	1,474,769	4,722,303	3,129,045	11,092,541
1991	1,160,069	1,661,170	6,522,394	4,236,592	13,580,225
1992	1,327,317	1,445,421	6,504,925	2,585,280	11,862,943
1993	1,740,726	1,573,097	5,296,771	2,507,243	11,117,837
1994	2,325,446	1,443,292	6,126,898	2,232,576	12,128,212
1995	1,584,353	1,430,054	5,917,075	2,026,262	10,957,744
1996	1,280,692	1,240,503	5,660,794	1,935,186	10,117,175
1997	1,000,733	1,155,186	3,821,795	2,026,785	8,004,499
1998	738,717	1,044,526	3,289,433	1,686,955	6,759,631
1999	2,212,333	973,427	4,394,948	1,893,593	9,474,301
2000	976,526	911,286	6,568,165	2,029,451	10,485,428
2001	1,108,894	963,736	6,706,572	2,300,345	11,079,547

*Black sea bass, vermilion snapper and yellowtail snapper recreational landings were not provided separately for each sector and this column represents the total recreational landings for these species.

Recreational Snapper Grouper Catch on the East Coast of Florida

Tables 8b and 8c do not contain catches from Monroe County nor the headboat sector in the South Atlantic. Also, these tables contain information on the numbers of fish caught (including fish released). The data are, therefore, not directly comparable to the previous table on landings in the South Atlantic.

In the waters on the east coast of Florida, the total number of recreational snapper grouper caught declined from 1986 to 1990 and thereafter, has been on a variable but increasing trend (Table 8b). The same trend is observed in the private/rental mode which accounts for an average of 66% of the total catch (average from 1999 through 2002). It should be noted that these figures do not indicate trends in weight of fish harvested.

Anglers fishing from private/rental boats and charter vessels, outside of three miles in Florida, target a number of mid-shelf and deepwater species in the snapper grouper fishery complex. There was no clear trend in the number of fish caught by private rental boats outside of three miles during the period 1986 to 1998. Thereafter, the total catch increased and has remained at this level throughout the rest of the time series. The total number of snapper grouper caught in 1995 was higher than the catch in 1993 (Table 8b).

A large proportion of the charterboat catch of snappers and groupers is taken in federal waters (an average of 66% during the period 1999 to 2002). For this sector, the number of fish caught fluctuated randomly with no discernible trend up until 1995 when a variable but

generally increasing trend began. This same pattern is also evident in the charterboat catch in the EEZ (Table 8b).

Table 8b. Total number of snapper grouper caught on the east coast of Florida by mode. Source: MRFSS, NOAA Fisheries, SEFSC.

Year	Charter Total	Charter >3 miles	Private/Rental Total	Private/Rental > 3 miles	Shore	Total
1986	193,137	186,894	4,241,523	1,203,296	4,778,120	9,212,780
1987	76,959	49,199	5,504,965	1,640,959	758,905	6,340,829
1988	219,351	133,277	4,037,879	1,007,489	1,775,985	6,033,215
1989	176,568	38,533	4,247,383	1,547,611	1,703,209	6,127,159
1990	118,686	103,549	3,355,196	717,587	1,537,792	5,011,674
1991	57,698	21,378	5,249,065	1,266,876	2,738,692	8,045,455
1992	134,487	67,807	5,672,408	1,624,274	2,122,106	7,929,001
1993	73,932	32,474	4,617,886	920,194	2,005,849	6,697,668
1994	129,442	98,244	6,162,658	1,322,799	2,393,880	8,685,979
1995	71,850	17,193	5,042,068	1,087,170	2,720,578	7,834,496
1996	113,944	53,836	5,031,324	1,335,440	2,094,695	7,239,963
1997	140,120	127,013	5,491,658	980,367	2,856,271	8,488,049
1998	204,027	122,535	5,207,075	1,209,812	2,596,984	8,008,087
1999	430,730	253,937	6,862,017	2,051,735	2,239,972	9,532,720
2000	325,900	251,824	7,562,568	2,649,454	3,389,033	11,277,501
2001	385,314	263,341	5,938,512	2,046,055	4,094,840	10,418,665
2002	358,559	216,226	6,171,142	1,772,140	2,637,722	9,167,422

For all modes in Florida the average snapper grouper recreational catch in the three years prior to the prohibition was lower than the average catch during the three years after the prohibition (Table 8c). However, the catch in the EEZ showed a decrease after the prohibition (Table 8c). This decrease occurred in the private/rental boat mode in the EEZ. In contrast, an increase was observed for the charter sector in the EEZ after the prohibition.

Table 8c. Comparison of snapper grouper catches taken from the east coast of Florida prior to and after the prohibition of snapper grouper fishing in the *Oculina* Experimental Closed Area. Source: MRFSS, NOAA Fisheries, SEFSC.

Area or Mode	Average number of fish caught in 1991, 1992 & 1993	Average number of fish caught in 1995, 1996 & 1997
Charter	88,706	108,638
Private/Rental	5,179,786	5,188,350
Shore	2,288,883	2,557,182
Total snapper grouper catch	7,557,375	7,854,169
Ocean >3 miles - Charter	40,553	66,014
Ocean >3 miles – Private/Rental	1,270,448	1,134,326
Total Catch in the EEZ	1,311,001	1,200,340

A further examination of the catch composition indicates that for private and rental boats fishing in the EEZ the main decrease in average catch following the closure can be attributed to white grunt, black sea bass, bluestripe grunt, red snapper, vermilion snapper, rock sea bass and yellow jack (Table 8d). Of these species only red and vermilion snapper are listed as the more abundant species in the *Oculina* Experimental Closed Area (Table 4). There was an increase in catch of gray snapper and bar jack. The total charter catch outside of three miles increased after the prohibition. However, there was a decrease in the red snapper and black sea bass charterboat catch.

The snapper grouper fishery is one of the most heavily regulated fisheries in the South Atlantic. The fluctuations in harvest, therefore, cannot be solely attributed to the closed area restrictions. Other measures were implemented in Amendments 6 and 7 to the Snapper Grouper Fishery Management Plan and Regulatory Amendment 6 went into effect in 1994 and 1995. Section 1.5 of this document contains a detailed account of these regulations.

Table 8d. Species for which there were major differences in average catch (numbers of fish) prior to and immediately after the prohibition. Source: MRFSS, NOAA Fisheries, SEFSC.

SPECIES	Average Catch 1991, 1992, 1993 (Numbers of fish)	Average Catch 1995, 1996, 1997 (Numbers of fish)
Private/Rental Mode outside of Three Miles		
White Grunt	185,841	101,748
Black Sea Bass	327,754	282,725
Bluestriped Grunt	52,898	15,286
Red Snapper	41,736	16,908
Vermilion Snapper	61,296	43,617
Rock Sea Bass	39,229	22,436
Yellow Jack	17,928	1,552
Bar Jack	4,164	20,071
Gray Snapper	50,757	96,552
Charter Mode outside of Three Miles		
Red Snapper	21,810	1,454
Black Sea Bass	14,381	3,148
Vermilion Snapper	2,795	16,058
Blue runner	2,182	46,040

Charter/Headboat Sector

There is no specific information on the for-hire sector that currently operates in the South Atlantic snapper grouper fishery. The information presented below comes from two sources. Holland et al. (1999) conducted a study of the charterboat sector in 1998 and provided information on charterboats and headboats engaged in all fisheries. The Southeast permits database contains information on snapper grouper permits issued to commercial and for-hire vessels. In the South Atlantic, charterboats and headboats are required to have a snapper grouper for-hire permit to fish for or possess snapper grouper species in the South Atlantic EEZ. The for-hire fishery operates as an open access fishery and not all of the permitted snapper grouper for-hire vessels are necessarily active in this fishery. Some vessel owners have been known to purchase open access permits as insurance for uncertainties in the fisheries in which they currently operate. In fact, there is usually a large proportion of latent permits in open access fisheries.

Since 1999 there has been an increasing trend in the numbers of permits issued to for-hire operations in the South Atlantic (Table 9a). In 2002 there were 1,221 charter permits issued. These permits were categorized by home port state. There is a lot of mobility in this fishery. A vessel could be moved from area to area within a state and between states in a given year. The number of permits by state represents the vessel's location at the latest date within a particular year. The majority, 776, of these permitted vessels are home ported in Florida. Many vessels with commercial snapper grouper permits also hold for-hire snapper grouper permits in the South Atlantic. The number of commercial snapper grouper vessel owners purchasing these charter permits has increased from 1999 through 2001. In 2002 a total of 227 commercial snapper grouper vessel owners purchased a for-hire permit for the snapper grouper fishery (Table 9a).

Table 9a. Snapper grouper charter permit holders by home port state. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

All charter permit holders					Charter Permit holders with Commercial Snapper/Grouper Permits			
Home Port State	1999	2000	2001	2002	1999	2000	2001	2002
Florida	361	419	675	776	133	133	144	145
North Carolina	134	132	180	195	37	41	39	35
South Carolina	73	77	138	129	29	32	39	34
Georgia	8	9	25	27	3	3	4	5
Virginia	3	7	10	11	2	5	6	6
Other States	23	35	45	38	2	4	3	2
Gulf States	19	21	36	44				
Unknown						1		
Total	612	688	1,097	1,221	206	219	235	227

In addition to the permits data, Table 9b contains estimates of the number of active for-hire vessels in the South Atlantic during 1998 (Holland et al. 1999). A total of 1,080 charter vessels and 96 headboats operated in all fisheries during 1998. Most active for-hire vessels were located in Florida (Table 9b).

Table 9b. Charterboats and headboats operating in the South Atlantic during 1998. Source: Holland *et. al.* (1999)

State	Number of Headboats	Number of Charter Boats
North Carolina	18	207
South Carolina	18	174
Georgia	2	56
Florida-Atlantic Coast	42	413
Florida -Keys	16	230
Total	96	1,080

The majority, 65%, of for-hire permitted vessels are in the 21-40 feet length range (Table 9c). There was little change in the length composition of these permitted vessels during the period 1999 through 2002 (Table 9c).

Table 9c. Proportion of permitted charter/headboat vessels in each length category. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Category	1999	2000	2001	2002
Less than 20 Feet	2%	2%	3%	3%
20-29 feet	31%	32%	31%	34%
30-39 feet	33%	33%	33%	31%
40-49 feet	24%	22%	21%	19%
50-59 feet	7%	7%	8%	8%
60-69 feet	2%	2%	2%	3%
70-79 feet	1%	1%	1%	2%
80-89 feet	0%	0%	0%	0%
90-117 feet	1%	1%	0%	0%

The number of for-hire snapper grouper permits issued to vessels located in the area of interest has steadily increased from 1998 and totaled 94 in 2002 (Table 9d). It is not known how many of these vessels would fish in the closed area should the prohibition sunset.

Table 9d. Distribution of charter/headboat permitted vessels by area in Florida. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Location	1999	2000	2001	2002
Area of Interest	46	46	81	94
North of the Area of Interest	50	53	72	90
South of the Area of Interest	63	63	88	92
Florida Keys	164	203	309	325
Gulf Coast of Florida	38	54	125	175
Grand Total	361	419	675	776

The average length of vessels in the area of interest is 34.4 feet (calculated from data in the NMFS Southeast Region permits database). At least 70% all vessels were in the 21-39 foot length range (Table 9e). Other information on vessel characteristics were taken from Holland et al. (1999). Holland et al. (1999) surmised that charterboats in Florida tend to be less specific in terms of species targeting behavior when compared to charterboats in the other South Atlantic states. In their study 47.7% of all captains in Atlantic Florida said they don't have specific targets but spend their time trolling or bottomfishing for any species. The most popular species for the Florida Atlantic vessels that had specific targets were king mackerel, dolphin, billfish, wahoo and amberjack. In 1998, on the Florida Atlantic coast, the average length of charter vessels was 39 feet and mean horsepower was 617 hp. In this study about 69% of charterboats in Florida had twin engines and over 87% used inboard engines. On the Atlantic side of Florida 68% of the charterboats were owner operated.

Most of the Florida charter trips were either full day or half day trips, and only about 8% of charter vessels reported overnight trips. In the Atlantic 59% of all trips were half day, 38% were full day and 3% overnight. The mean number of full-day charter trips was 54, and the number of half day trips per vessel averaged 88. The number of overnight trips was 6.3 per year per vessel. The average number of passengers per trip was 4.4. These authors estimated that, overall, the mean number of trips for Florida charter vessels was 143.5 which corresponded to a total of 674 passenger trips per vessel annually (Holland et al. 1999).

Table 9e. Proportion of permitted charter/headboat vessels in each length category in the area of interest in Florida. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Category	1999	2000	2001	2002
Less than 20 Feet	2%	2%	4%	1%
21-29 feet	46%	52%	38%	38%
30-39 feet	22%	28%	35%	35%
40-49 feet	17%	11%	11%	10%
50-59 feet	7%	4%	7%	10%
60-69 feet	4%	0%	4%	5%
71 feet	2%	2%	1%	1%

Value and Economic Impact of Recreational Fishing in the South Atlantic

The statistics presented in the preceding tables represent participants and effort in all saltwater sport fishing, including snapper grouper fishing. The tables also present a description of the charter/headboat entities. Participation is one indicator of the value of saltwater recreational fishing. Economists provide a dollar value equivalent to the net satisfaction that anglers experience over and above their costs of fishing which is referred to as consumer surplus (non-market benefit). The magnitude of this non-market benefit from the recreational experience is dependent on several quality determinants which include species composition, fish size, catch rate, bag limit, and aesthetics.

As the population of fish increases it is expected that the angler success rate would increase and the unit harvesting cost should decrease, provided all other conditions remain the same (*ceteris paribus*). These quality variables are important not only in their determination of the value of a recreational fishing trip but also in their influence on total demand for recreational fishing trips.

Recent estimates of the economic value of a day of saltwater recreational fishing are available for the South Atlantic from different sources. These estimates are not specific to snapper grouper fishing trips but shed some light on the magnitude of an angler's willingness to pay for this activity. The mean value of access per trip was estimated at \$109.31 for the South Atlantic. Willingness to pay for an incremental increase in catch and keep rates per trip only amounted to \$3.01 for bottom fish species (Haab et al. 2001). Contingent valuation results from the same survey group yielded marginal valuation estimates of \$1.06 to \$2.20 to avoid a one fish red snapper bag limit decrease. The latter are averages across all recreational anglers and not only those anglers who target/caught red snapper. The valuation estimates previously discussed should not be confused with angler expenditures (cost to anglers) which benefit a number of sectors that provide goods and services for saltwater sportfishing.

A recent study conducted by NOAA Fisheries (Gentner et al. 2001) provides estimates of saltwater recreational fishing trip expenditures. The average expenditure per trip varies depending on the state, type of trip, duration, travel distance, and other factors (Table 10a). As expected, trip expenditures for non-residents are higher than for in-state residents. Compared to in-state residents, non-residents travel longer distances and incur expenses for food and lodging. Some in-state residents will incur the higher trips expenses if they reside far away from the coast.

The resident expenses per trip by mode for each state were used in calculating expenditures in the snapper grouper recreational fishery by mode (Table 10b). These data were used together with the average number of snapper grouper fishing trips by mode by state for the period 2000 to 2002. These estimates do not include expenditures on recreational fishing in Monroe County, Florida Keys.

Table 10a. Summary of expenditures on saltwater trips estimated from a 1999 MRFSS add-on survey (Gentner et al. 2001).

	North Carolina		South Carolina		Georgia		Florida	
Item	Resident	Non-Resident	Resident	Non-Resident	Resident	Non-Resident	Resident	Non-Resident
Shore mode trip expenses	\$201.66	\$110.71	\$54.12	\$104.27	\$44.03	\$115.13	\$36.90	\$141.30
Private rental mean trip expenses	\$71.28	\$92.15	\$35.91	\$67.07	\$293.08	\$77.51	\$66.59	\$94.15
Charter modes	\$201.66	\$75.53	\$139.72	\$220.97	\$419.94	\$155.90	\$96.11	\$196.16
Charter fee-average-per day for spenders	\$173.11	\$88.24	\$195.88	\$158.84	\$147.36	\$119.01	\$107.08	\$130.05

Recreational fishermen incur a total of \$193 million in trip expenses to fish for snapper grouper species in the South Atlantic (Table 10b). As expected, a large portion of these expenses are made along the east coast of Florida. The trip expenditures for fishing in the EEZ off Florida was estimated at \$15.14 million (Table 10b). The economic impact of this fishery is larger than the figures presented in Table 10b since angler expenses for fishing tackle, gear and vessel purchase and maintenance are not included in these estimates. Also, as previously noted expenditures incurred for trips in Monroe County (Florida Keys) are not included in these calculations.

Table 10b. Estimated trip expenditures on snapper grouper trips in the South Atlantic by State.

State	Mode	Average number of Trips 2000-2002	Revenue
Florida	Charter	67,777	\$6,514,047
	Private/Rental	1,450,707	\$53,531,088
	Shore	979,755	\$65,241,885
	Total	2,498,239	\$125,287,021
Florida EEZ	Charter	39,478	\$3,794,231
	Private/Rental	307,514	\$11,347,254
	Total	346,992	\$15,141,485
Georgia	Charter	1,698	\$712,918
	Private/Rental	44,505	\$1,959,570
	Shore	34,083	\$9,989,046
	Total	80,286	\$12,661,534
North Carolina	Charter	12,313	\$2,482,972
	Private/Rental	202,830	\$40,902,765
	Shore	64,491	\$4,596,942
	Total	279,634	\$47,982,680
South Carolina	Charter	10,988	\$1,535,243
	Private/Rental	93,106	\$5,038,897
	Shore	13,800	\$495,558
	Total	117,894	\$7,069,698
Entire South Atlantic	Charter	92,775	\$11,245,181
	Private/Rental	1,791,149	\$101,432,320
	Shore	1,092,129	\$80,323,431
	Total	2,976,053	\$193,000,933

Financial Operations and Economic Impact of the Charter Sector in Florida

Holland et al. (1999) defined charterboats as boats for-hire carrying 6 or less passengers that charge a fee to rent the entire boat. This trip fee depended on state, trip length and the variety of services offered and reportedly ranged from \$292 to \$2,000 for the charter sector. Along the Atlantic coast of Florida, the average trip fee for a half-day trip was \$360, for a full-day trip was \$575 and for an overnight trip was \$1,285. The average gross revenue per vessel was \$51,000 for the Atlantic coast of Florida.

The demand for charter and headboat trips will depend on the fee charged and the quality variables listed previously such as species composition, fish size, catch rate, bag limits, and aesthetics. Profits within the for-hire sector will depend on trip demand, the fee charged and the

cost of the fishing operation. It is expected that the cost of fishing will bear some inverse relationship to the population size (costs of searching for fish will decrease as stock abundance and distribution increases).

Capital investment in Florida charter vessels averaged \$109,301 (hull and superstructure, engine, electronics, and other equipment including tackle). The average investment by category is: \$90,989 for the hull and superstructure; \$40,518 for the engine; \$5,568 for electronics; and \$5,878 for other equipment and tackle. Charterboat owners incur expenses for inputs such as fuel, ice, and tackle in order to offer the services required by their passengers. Most expenses incurred in 1997 by charter vessel owners were on crew wages and salaries and fuel (Holland et al. 1999). The average business expenditures incurred was \$68,816 in 1997 (Holland et al. 1999).

3.2.2.3 The Commercial Fishery

The commercial snapper grouper fishery in the South Atlantic is comprised of vessels that utilize a number of different gear types and target a variety of species. The species composition of the catch depends on the fishing location, time of year, and distance from shore. The number of permitted vessels provides a good estimate of the size of the snapper grouper commercial fishery. However, not all permitted vessels actively fish for snapper grouper species every year.

In the South Atlantic, limited access permits for the commercial snapper grouper fishery were first issued in late 1998. Additional permits were issued in 1999 as a result of an Emergency Action taken by the Secretary of Commerce to reopen the snapper grouper limited access permit application process to potential qualifiers. There were a total of 1,174 permits in 2002 which represents a decline of 267 from 1999 (Table 11a). The limited access permit holders can be divided into two groups. The majority (88% of all snapper grouper permit holders in 2002) are vessel owners who hold the trip-unlimited transferable permits. The other category of permit holders are those who were issued the 225 pound trip-limited permits that are not transferable to another owner.

Table 11a. Commercial snapper grouper permitted vessels in the South Atlantic.

Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Home Port State	1999	2000	2001	2002
Florida	1,082	1,001	945	883
North Carolina	230	201	186	168
South Carolina	84	93	93	87
Virginia	15	15	13	13
Georgia	15	12	14	13
New Jersey	5	6	6	7
New York	4	5	2	2
Louisiana	2	3	1	
Maine	1	2	2	
Unknown		1		
Massachusetts		1	1	
Tennessee	1	1	1	1
California	1			
Colorado	1			
Connecticut				
Grand Total	1,441	1,341	1,264	1,174

The majority of these permit holders keep their vessels docked in Florida, followed by North Carolina and South Carolina (Table 11a). A large proportion (over 70%) of these vessels are between 20 and 39 feet in length (Table 11b).

Table 11b. Length distribution of snapper grouper commercial vessels in the South Atlantic. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Category	Number of Vessels				Percentage of Total			
	1999	2000	2001	2002	1999	2000	2001	2002
Less than 20 feet	53	40	37	41	4%	3%	3%	3%
20-29 feet	581	533	501	453	40%	40%	40%	39%
30-39 feet	456	438	430	407	32%	33%	34%	35%
40-49 feet	252	242	236	216	17%	18%	19%	18%
50-59 feet	39	37	32	33	3%	3%	3%	3%
60-69 feet	11	10	8	9	1%	1%	1%	1%
70-79 feet	7	7	5	6	0%	1%	0%	1%
81 feet	1	1	1	1	0%	0%	0%	0%
97 feet	1	1	1	1	0%	0%	0%	0%
Unknown	40	32	13	7	3%	2%	1%	1%
Grand Total	1441	1341	1264	1174				

There were 120 commercial snapper grouper permitted vessels with homeports in the area of interest in 2002. More than half (54%) of the permits were associated with vessels home ported in the Florida Keys (Table 11c), and within the Florida Keys a large concentration of vessels were found in Key West and Marathon.

Table 11c. Distribution of permit holders in Florida. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Location	1999	2000	2001	2002
Area of Interest*	148	142	135	120
North of the Area of Interest	103	89	82	87
South of the Area of Interest	194	172	158	149
Florida Keys	579	547	519	475
Gulf Coast	58	51	51	52
Grand Total	1082	1001	945	883

*The area of interest includes home port locations along the Florida Atlantic coast from Cape Canaveral to West Palm Beach.

Landings Distribution by Gear Type

Information on the value of snapper grouper species by gear type was taken from the Southeast Logbook for 2000 and 2001. Overall most (77.5%) of the snapper grouper species are caught by vessels that employ hook and line type gear (Table 12). It is interesting to note that while the powerhead and diving components only account for 3% of the total snapper grouper landings, these species make up 84% and 61% of the total catch in these gear groups. The longline vessels target the deepwater grouper and tilefish species in the snapper grouper fishery. In fact, in 2001 at least 66% of the total harvest of all the deepwater groupers and 61% of all deepwater tilefishes were caught on longline vessels. The longline vessels that report to the southeast logbook program obtain 60% of their landings from other fisheries such as the shark fishery. As expected the pot subsector is very dependent on black sea bass (Table 12).

Table 12. The relative importance of different gear types in the snapper grouper fishery (average for 2000 and 2001). Source: Southeast Logbook, NOAA Fisheries, SEFSC.

Item	Hook and Line	Longline	Powerhead	Diving	Pot
Percent of snapper grouper landings attributed to gear type	77.47%	9.55%	1.47%	1.50%	7.41%
Percent of snapper grouper species in total catch for gear type	84%	40%	84%	61%	97%

Snapper Grouper Commercial Landings and Value

The snapper grouper complex is one of the most important to the commercial harvesting sector in the South Atlantic. This fishery has been heavily regulated since the fishery management plan was implemented in 1983 (see Section 1.5 of this document). Apart from the response to fishery management regulations, fluctuations in landings can also be attributed to stock abundance and availability; physical and chemical oceanographic factors; natural events such as hurricanes; and input conditions such as fuel, market conditions and fleet dynamics. Ex-vessel prices for the various species in this complex will depend on quantity sold, market conditions (e.g., imports and relative prices of substitutes), product quality and consumer income levels. As abundance of targeted populations increases, the cost per unit harvest would decrease in the commercial harvesting sector (*ceteris paribus*) and, thus, net economic benefits would increase.

Data for the South Atlantic indicate that from 1981 to 1988 there was a slightly decreasing trend in overall snapper grouper landings from 12.09 million pounds to 9.64 million pounds (Table 13a). Subsequently, there was an increase and landings peaked in 1990 at 14.89 million pounds. Since 1991 there has been a steady decline in landings which appear to have stabilized at around 7 million pounds during the period 1999 through 2001 (Table 13a).

The cause of these fluctuations can be partly attributed to restrictive regulations taken to improve/maintain the health of snapper grouper species. This fishery was first regulated in 1983 with a number of size limit measures and certain gear restrictions. In 1991, Amendment 4 prohibited fish traps, entanglements nets, longlines for wreckfish and use of longline gear inside of 50 fathoms for

other snapper grouper species in the EEZ. There were also minimum size regulations and bag limits that went into effect during 1991. Implementation of the limited access program in 1998 reduced the number of commercial fishermen in the snapper grouper fishery (SAFMC 1997) and since that time the number of permit holders has declined by 267 (Table 11a). Commercial and recreational fishermen in the snapper grouper fishery have faced additional restrictive measures implemented in Amendment 9 (SAFMC 1998a) and Amendment 12 (SAFMC 2000) to the Snapper Grouper Fishery Management Plan. A detailed account of these regulations is contained in the history of management section of this document (Section 1.5).

Real ex-vessel value shows a similar trend as landings throughout this period (Table 13a). The peak in overall gross ex-vessel revenue occurred in 1990 when the harvesting industry earned a total of \$26.95 million dollars. In 2001, this declined to \$12.55 million. These revenue figures are not net benefits to the snapper grouper commercial fishery since the harvesting costs have not been deducted.

Landings on the east coast of Florida followed a similar trend to that of the total landings in the South Atlantic (Table 13a). Data for the east coast of Florida do not include the Florida Keys. Landings increased slightly from 1981 to 1982, declined in 1983, 1984 and 1985, and subsequently went on an increasing trend reaching a peak of 6.87 million pounds in 1990. Since 1990 there has been a steadily declining trend in landings to 2.14 million pounds in 2001 (69% decrease). A similar pattern was observed in the real ex-vessel revenue data (Table 13a). In 1990, the harvesting sector in Florida earned its greatest revenue to date, \$11.62 million. Since 1990, on the east coast of Florida, real and nominal ex-vessel revenue steadily declined to its lowest level in 2001 at \$3.55 million (69% decrease). Snapper grouper fishing in the *Oculina* Experimental Closed Area was prohibited in June 1994. The weight and value of landings on the east coast of Florida were lower in 1995 compared to 1993. It is unknown whether this reduction in landings and value is due to the closure or whether it is simply due to a declining trend in this fishery.

Table 13a. Dockside landings and value of snappers and groupers for the period 1981-2001 in the southern Atlantic states. Source: NOAA Fisheries, SEFSC.

South Atlantic (includes the Keys)				Florida East Coast excluding the Keys		
Year	Landings (pounds)	Ex-vessel Revenue	Real Ex-vessel Value (\$2001) *	Landings (pounds)	Ex-vessel Revenue	Real Ex-vessel Value (\$2001) *
1981	12,089,026	\$9,430,581	\$18,373,552	4,376,191	\$3,202,174	\$6,238,779
1982	13,727,112	11,184,385	20,525,954	5,955,322	4,772,619	8,758,869
1983	10,230,001	9,572,412	17,020,825	3,881,448	3,820,892	6,793,976
1984	10,071,282	9,565,674	16,304,917	3,476,771	3,158,947	5,384,500
1985	8,809,355	9,654,677	15,890,737	3,169,850	3,510,655	5,778,225
1986	9,340,164	11,776,670	19,029,637	3,836,391	4,751,645	7,678,069
1987	8,900,596	10,355,056	16,143,314	4,385,417	4,328,139	6,747,477
1988	9,642,320	11,956,594	17,899,516	3,985,994	4,439,796	6,646,559
1989	12,214,621	16,471,973	23,525,697	5,622,226	7,171,112	10,241,967
1990	14,885,034	19,890,672	26,952,089	6,865,561	8,575,587	11,620,019
1991	12,059,824	16,508,001	21,465,249	5,352,100	6,550,435	8,517,489
1992	10,646,256	13,648,155	17,227,999	4,794,057	5,172,450	6,529,158
1993	10,406,240	14,392,749	17,639,833	4,600,319	5,650,216	6,924,936
1994	10,610,032	14,649,408	17,506,141	4,420,053	5,512,242	6,587,166
1995	9,255,523	13,736,410	15,962,718	3,874,976	5,470,320	6,356,914
1996	7,987,078	12,208,749	13,780,557	3,172,372	4,675,449	5,277,387
1997	8,015,175	12,362,149	13,640,726	2,923,695	4,249,666	4,689,195
1998	7,287,773	11,805,392	12,826,595	2,759,095	4,073,829	4,426,228
1999	7,019,099	12,105,367	12,868,310	2,456,502	3,735,538	3,970,971
2000	7,013,320	12,613,801	12,972,730	2,663,309	4,228,346	4,348,665
2001	6,922,642	12,551,479	12,551,479	2,135,192	3,554,075	3,554,075

* Real value was calculated using the Consumer Price Index (CPI) and represents the purchasing power of earnings of a respective year in 2001 dollars.

Overall average value and landings were lower during the period after the closure compared to the period prior to the closure (Table 13b). On the east coast of Florida the largest reductions were in landings of wreckfish, tilefish, amberjacks, crevalle and sheepshead. However, there was a large increase in landings of snowy grouper, blue runner, red porgy and grunts after the closure (Table 13b). The decrease in landings and revenue cannot be wholly attributed to the closed area regulation. Other measures were implemented in Amendment 6 such as trip limits for snowy grouper and tilefish and recreational bag limits for some of the deepwater species. Also, Regulatory Amendment 6 (SAFMC 1994b) contained measures such as a size limit on gray triggerfish in the EEZ off the Atlantic coast of Florida.

Table 13b. Species where there were major differences in landings (pounds) prior to and after the closure. Source: NOAA Fisheries, SEFSC.

Species Name	South Atlantic		Florida East Coast excluding the Keys	
	Average 1991, 1992, 1993	Average 1995, 1996, 1997	Average 1991, 1992, 1993	Average 1995, 1996, 1997
Wreckfish	1,364,259	465,462	621,443	154,506
Tilefish	1,072,373	502,574	673,458	315,467
Crevalle	578,872	333,582	569,340	325,549
Sheepshead	417,540	267,980	362,887	189,538
Amberjack	1,173,157	1,033,700	832,213	663,780
Scups or Porgies, Unc.	276,296	93,019	160,272	79,821
Snappers, Unc.	82,607	15,664	63,386	13,023
Grouper, Unc.	192,244	49,168	52,443	11,038
Snapper, Yellowtail	169,926	127,303	168,145	127,226
Snapper, Mutton	113,281	74,335	110,098	71,181
Grouper, Black	81,402	44,794	73,728	43,827
Triggerfishes	311,622	513,467	89,322	71,135
Grouper, Warsaw	18,507	1,566	16,463	618
Sea Basses	1,028,636	855,821	29,240	14,780
Grouper, Yellowedge	35,229	18,549	26,332	14,798
Grouper, Snowy	471,489	381,824	135,663	151,842
Snapper, Red	151,531	137,033	70,259	86,921
Blue Runner	52,833	77,314	50,320	75,170
Grunts	275,356	251,649	53,468	93,420
Porgy, Red	389,196	356,673	0	43,089
Total Landings	11,037,440	8,419,259	4,915,492	3,323,681
Total Value	\$14,849,635	\$12,769,103	\$5,791,034	\$4,798,478
Total Real Value (\$2001)	\$18,777,694	\$14,461,334	\$7,323,861	\$5,441,165

Economic Survey of Snapper Grouper Vessels in 1994

The following information is taken directly from the executive summary of the economic survey of commercial snapper grouper vessels along the U.S. South Atlantic coast in 1994 (Waters et al. 2000). This is the most comprehensive account of the economic costs and earnings of snapper grouper commercial vessels in the South Atlantic.

This survey provides the first, comprehensive source of economic information about the population of boats in the commercial snapper grouper fishery along the Atlantic seaboard. One hundred forty seven commercial reef fish boats from Dare County, North Carolina, through Dade County, Florida, were examined in a stratified random sampling design, with strata defined by area, primary gear and length of boat. The sample was selected from a universe of 709 boats with snapper grouper permits that reported on their permit applications that their most important gear was vertical lines with bandit reels or rods and reels, bottom longlines, or fish traps, even though many of them also used other gears. Interviewers asked respondents for: background information about themselves and their boats; their capital investments in vessel, gear and electronics; and detailed information about fishing effort, catches, revenues, and routine harvesting costs per trip for

their two most important kinds of fishing trips for reef fish. If there was only one kind of trip for reef fish, then information was collected about it and the most important kind of trip for other species.

Method of Analysis

Characteristics of respondents and their boats were summarized for boats that primarily used vertical lines, bottom longlines or fish traps in the northern area (i.e., from North Carolina through St. Augustine, FL) and for boats that primarily used vertical lines or bottom longlines in the southern area (i.e., south of St. Augustine, FL). Averages for each characteristic (such as the average age of respondent or average investment in boat and equipment) were calculated for each group of boats and for all boats combined. Group and population totals (such as the total investment for all boats) were derived by expanding the survey responses to the entire sampled population of 709 snapper grouper boats. Weighting factors accounted for differences among strata in the probabilities of individual boats being included in the sample.

Characteristics of Respondents

Respondents were characterized with regard to their dependence on the commercial snapper grouper fishery as a source of household income. On average, respondents were in their early to mid forties, with an average of 17 years experience in commercial fishing. Respondents on boats with fish traps were the oldest, on average, and those on boats with vertical lines in the southern area were the youngest. On average, respondents who used bottom longlines or fish traps were more experienced fishermen than were respondents who used vertical lines. Household incomes ranged from less than \$10,000 to more than \$150,000, with more than 50% of respondents citing household incomes of less than \$40,000. Respondents who primarily used bottom longlines or fish traps earned, on average, more than one-half of their household incomes from commercial fishing, whereas respondents who used vertical lines did not. Respondents in the northern area who used bottom longlines comprised the only group to average more than 50% of their household incomes from commercial fishing for reef fishes. Overall, respondents in the northern area relied more heavily on commercial fishing for reef fishes as a source of household income than did respondents in the southern area. However, respondents in the northern area derived a smaller fraction of their household incomes from other kinds of commercial fishing because they were more likely to charter whereas respondents in the southern area relied more heavily on commercial fishing for non-reef species such as king mackerel. In approximately two-thirds of the households someone other than the respondent also was employed to supplement household income.

Characteristics of Boats

Boats were described in terms of their physical characteristics. Boats were relatively small. The average length was 32.7 feet, with nearly all sampled boats being less than 50 feet in length. Boats with bottom longlines tended to be the longest, had the most powerful engines, the greatest fuel capacities, and the largest holding boxes for fish and ice. Boats with vertical lines, especially in the southern area, tended to be the shortest, had the least powerful engines, the smallest fuel capacities, and the smallest holding boxes for fish and ice.

Also, boats were described in terms of their financial characteristics. On average, boats and gear in the northern area embodied greater investments than did boats in the southern area. Boats with bottom longlines in the northern area required the greatest investments, and boats with vertical lines in the southern area required the smallest investments. The total investment in boats and equipment for the sampled population of snapper grouper boats was estimated to be \$54.0 million.

Resale value was interpreted as the value of capital currently invested in the snapper grouper fishery. Average resale value in the northern area was \$93,000 for boats with bottom longlines, \$55,289 for boats with fish traps and \$53,205 for boats with vertical lines. Average resale value in the southern area was \$64,860 for boats with bottom longlines and \$37,215 for boats with vertical lines. The estimated total resale value of commercial snapper grouper boats was \$35.4 million.

Financial Performance on Different Kinds of Fishing Trips

Some boats fished in one kind of activity year-round whereas others rotated among several kinds of fishing trips according to seasonal availability of fish, seasonal variation in prices, fishery regulations and so forth. An important objective of the survey was to estimate average net operating revenues per boat per trip and per boat per year that were earned on the most important kinds of fishing trips taken by snapper grouper fishermen. A secondary objective was to estimate the total number of boats that participated in each kind of fishing and total catches, revenues, trip costs and net operating revenues for those boats, although the possibilities for errors in estimation exist because each interview was limited to questions about a maximum of two kinds of fishing even if the boat participated in more than two kinds of fishing per year. Net operating revenues were defined as trip revenues minus routine trip costs, which included fuel, bait, ice, lost gear, food, packing charges if any, and other miscellaneous supplies. Net operating revenues represent the combined payments to boat owner, captain and crew and should not be interpreted as profit because they exclude fixed costs and other variable costs that were not routinely encountered per trip. Average net operating revenue per person per day fished was used to compare the overall economic performance of boats on different kinds of fishing trips after correcting for variations in the duration of trips and the number of persons aboard, and is not an accounting of actual payments or shares to boat owner, captain or crew.

Boats with black sea bass pots constituted an important component of the snapper grouper fishery in the northern area. An estimated 90 boats landed nearly 2.7 million pounds of all species worth \$4.1 million on trips with pots for black sea bass, with average revenues of \$44,965 per boat per year. After adjusting for variation among fishing activities in duration of trips and number of persons aboard, pot-fishing for black sea bass was, on average, the most profitable activity examined in this survey. Boats with black sea bass pots averaged \$349 per person per day fished for black sea bass and \$30,494 per year after deducting routine trip costs. Peak fishing activity for black sea bass occurred between November and March, with some boats having additional sources of income during the remainder of the year. Commonly mentioned alternatives to black sea bass were fishing with vertical lines for gag throughout the year but primarily between April and October, chartering between May and October, and fishing for king mackerel between October and April.

Trips for king mackerel represented the next most profitable fishing activity examined here for the northern area. Net operating revenues on king mackerel trips averaged \$292 per person per day fished, but only \$16,046 per year because average catches per trip were relatively low compared to other fishing activities in the northern area, and because average days fished for king mackerel per boat per year were relatively low. An estimated 107 boats targeted king mackerel, primarily between October and April, with peak fishing activity occurring in March. The main alternative activities to king mackerel were gag, especially between April and November, fishing charters between April and October, and black sea bass, primarily between November and January.

Deep water groupers and tilefish constituted an important component of the snapper grouper fishery in both northern and southern areas, although small sample size necessitated that analyses be completed with observations for both areas combined rather than for each area separately. An estimated 66 boats used bottom longlines to land a total catch of 3.3 million pounds worth \$5.3 million in the northern and southern areas combined. Golden tilefish and snowy grouper were the primary target species caught with bottom longlines, with yellowedge grouper, greater amberjack, sharks and blackbelly rosefish being among the non-target species. Boats with bottom longlines fished year-round for deep water species, and averaged more days fished per year (105 days), landed greater quantities of fish per year (50,552 pounds), received more revenue per year (\$79,860), and earned higher net returns per year after deducting routine trip costs (\$45,598) than did boats when fishing in other sectors of the snapper grouper fishery. However, these trips were the longest among the fishing activities examined here. Hence, net operating revenues per person per day fished, at \$235, averaged less than trips for black sea bass or king mackerel in the northern area.

The temperate, mid-shelf complex clearly was the mainstay of the snapper grouper fishery in the northern area. An estimated 339 boats took trips in the northern area for mid-shelf groupers and snappers (but not necessarily at the same time or continuously throughout the year), with an estimated total catch of nearly 7.0 million pounds worth nearly \$14.4 million. Revenues averaged \$42,425 per boat per year on trips for mid-shelf species. Gag and vermilion snapper were the species most often targeted, with porgies and triggerfish being the most frequently caught non-target species. Other species landed on mid-shelf trips included grunts, black sea bass, greater amberjack, scamp, red snapper and king mackerel. Gag were landed throughout the year, with the fewest number of boats being active during January, February and March. Vermilion snapper were also caught throughout the year with the least fishing activity occurring during May and June. The most frequently cited alternatives to fishing for mid-shelf species were fishing charters between April and October, king mackerel fishing between October and April, and fishing for black sea bass between November and March.

Trips for mid-shelf species were among the least profitable in the northern area, perhaps because of the high level of participation in the mid-shelf fishery. Average quantities landed and revenues per trip ranked second to trips with bottom longlines for deep water groupers and tilefish, but trips for mid-shelf species were relatively long with a relatively large number of persons aboard. Hence, boats averaged only \$167 per person per day fished after deducting routine trip costs. Nevertheless, net operating revenues averaged \$28,556 per boat per year because mid-shelf species were available throughout the year, with allowances for bad weather during the winter months.

Snowy grouper were caught by boats with vertical lines in a segment of the snapper grouper fishery that also landed mid-shelf species such as vermilion snapper. An estimated 41 boats landed 0.4 million pounds of deep water groupers, tilefish and mid-shelf species worth \$0.6 million. Trips by boats with vertical lines for deep water species averaged \$160 per person per day fished, which was slightly lower than the average net return of trips for mid-shelf species. The main fishing alternative was king mackerel, especially in October, November and December.

In general, the fishing activities examined for the southern area were not as profitable as the activities in the northern area. Catches per trip tended to be lower in the southern area than in the northern area. Also, the average number of days fished per boat per year in each activity was relatively low. Hence, net revenues per person per day fished and per boat per year after deducting routine trip costs were relatively low.

Trips for mid-shelf groupers and snappers represented the most profitable fishing activity examined for the southern area. When fishing for mid-shelf species, boats averaged \$229 per person per day fished and \$13,747 per year after deducting routine trip costs. An estimated 97 boats landed 0.8 million pounds worth approximately \$1.7 million. Boats averaged 42 days fished per year for mid-shelf species. Gag was caught year-round, especially between January and March. A smaller number of boats caught red snapper, especially between January and July. Supplemental species included mutton snapper, red grouper, greater amberjack and cobia, among others. The main fishing alternatives included king mackerel throughout the year, mutton snapper between April and August, greater amberjack in March and May, gray snapper from March through June and yellowtail snapper from March through September.

Trips for king mackerel represented the next most profitable fishing activity examined here for the southern area. Net operating revenues on king mackerel trips averaged \$195 per person per day fished and \$13,306 per year. An estimated 51 boats targeted king mackerel, with fishing activity occurring throughout the year but with peak activity between December and May. Boats averaged 36 days fished per year for king mackerel. Their main alternatives were gag between January and March, and mutton snapper, yellowtail snapper, golden tilefish and snowy grouper year-round.

Trips for greater amberjack averaged \$185 per person per day fished and \$11,770 per boat per year. Greater amberjack were targeted throughout the year, with peak fishing activity occurring in March and May, and minimal activity occurring in April, July and August. An estimated 66 boats landed 1.1 million pounds worth \$1.0 million. Alternative species included gag between January and March, mutton snapper between April and June, yellowtail snapper between May and September, and king mackerel between December and April.

The fishery for tropical snappers attracted the greatest number of boats in the southern area. There were an estimated 170 boats that landed nearly 1.0 million pounds worth nearly \$2.0 million. Target species included yellowtail snapper, mutton snapper, and gray snapper. More than 20 species were listed as supplemental catches, with black grouper, red grouper, mutton snapper, gray triggerfish, and greater amberjack being frequently mentioned. The chief alternative fishing activities included king mackerel throughout the year, spiny lobster between August and March, gag between January and March, greater amberjack in March, May and June, and charter fishing between May and December.

As was the case in the northern area, the fishing activity with the greatest level of participation was one of the least profitable. Boats that fished for tropical snappers averaged only 236 pounds and revenues of \$440 per trip. Net returns after deducting routine trip costs averaged only \$128 per person per day fished and \$8,747 per boat per year.

Overall Financial Performance

Interviewers also asked respondents about their boat's gross revenues and net income before taxes for all fishing activities combined. The estimated total revenues for the sampled population of snapper grouper boats were \$31.8 million, with aggregate net incomes of \$9.5 million. In general, boats with bottom longlines achieved the highest gross revenues and earned the highest net incomes, while boats with vertical lines achieved the lowest revenues and net incomes. Average net incomes, in declining order, were \$83,224 for boats that primarily used bottom longlines in the northern area, \$23,075 for boats that primarily used black sea bass pots in the northern area, \$15,563 for boats that primarily used bottom longlines in the southern area, \$11,649 for boats that primarily used vertical lines in the southern area, and \$8,307 for boats that primarily used vertical lines in the northern area. Overall, boats in the northern area averaged \$14,143 net income based on average

revenues of \$48,702, while boats in the southern area averaged \$12,388 net income based on average revenues of \$39,745.

The following table (Table 14) and description of vessel operating costs and characteristics were collected from an economic survey (Rhodes et al. 1996). When examining vessel characteristics by region, vessels in the GA/C (St. Augustine, Florida and north) area were larger, more powerful, had a larger fuel capacity and had a larger fish hold capacity. These authors surmised these differences are most likely related to the travel distance to the fishing grounds and subsequent environmental conditions fishermen must endure farther north. Fishermen from St. Augustine north travel greater distances to fish and often withstand heavier seas than fishermen to the south. Therefore, they need larger vessels that can travel the longer distance to fishing grounds and withstand the harsher environmental conditions. The associated trip and fixed costs are also naturally higher with a larger vessel (Table 14)

Table 14. Snapper grouper vessel and economic characteristics by region.* Source: Rhodes, Waltz, and Wiggers (1996).

Variable	All Areas	GA/C	S/CFL
Average Vessel Length (ft.)	34	38	31
Average Vessel Horsepower (hp)	343	352	325
Average Vessel Fuel Capacity (gal)	469	553	313
Average Vessel Fish Hold Capacity (lb.)	3,585	4,143	2,557
Average Vessel Trip Costs (\$)	527	973	357
Average Vessel Fixed Costs (\$)	17,007	19,566	12,228

* GA/C - St. Augustine, Florida and north; S/CFL - South of St. Augustine to Dade/Monroe County Line.

Processors and Dealers

In the South Atlantic snapper grouper dealers are required to have a federal permit to purchase snapper grouper species.

Table 15. Dealers with snapper grouper permits in 2002 and state where the business was located. Data Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

State Where Business is Located	Number of permitted Dealers
Florida	126
North Carolina	43
South Carolina	18
Georgia	4
Louisiana	13
Texas	9
New York	8
California	5
Massachusetts	5
Virginia	3
Alabama	3
Mississippi	2
New Jersey	2
Hawaii	1
Illinois	1
Maryland	1
Missouri	1
Washington	1
Ohio	1
Rhode Island	1
Maine	1
Total	249

During 2002 a total of 249 snapper grouper dealer permits were issued by NOAA Fisheries. Just over half of these permits, 126, were issued to dealers who had businesses located in Florida (Table 15). In 2002 there were 43 permitted dealers in North Carolina, 18 permitted dealers in South Carolina and 4 permitted dealers in Georgia. Another 58 snapper grouper dealer permits were issued to businesses located in other states outside of the South Atlantic Council's area of jurisdiction. This is an indication of the wide geographic scope of the primary and secondary distribution channels that are inherent in this fishery. These dealers also held permits in other federally managed fisheries (rock shrimp, wreckfish, reef fish, shark, swordfish, and golden crab) indicating that their businesses do not exclusively depend on the purchase and sale of snapper grouper species.

3.2.3 Social and Community Profile

Communities Affected by Proposed Amendment 13A

When conducting social analysis, employing a holistic perspective is preferred so that all important elements of the analysis might be accounted for in an ecosystemic way. This approach (similar to the ways biologists also adjust for uncertainty) provides a hedge against underestimating social impacts when there is a lack of complete data.

When the *Oculina* HAPC was first created by Council action in 1984, no community baseline study was conducted to help assess the social or cultural impacts of creating this protected, offshore area. What was learned about the communities adjacent to the *Oculina* HAPC was mostly after the fact and anecdotal in nature. To this day, there has been no systematic social or economic impact assessment conducted in these communities. However, interviews, field research, and other sources of information (public hearings, scoping meetings, phone calls, letters, etc.) indicate that the original closure and subsequent regulations have impacted some central Florida communities more than others.

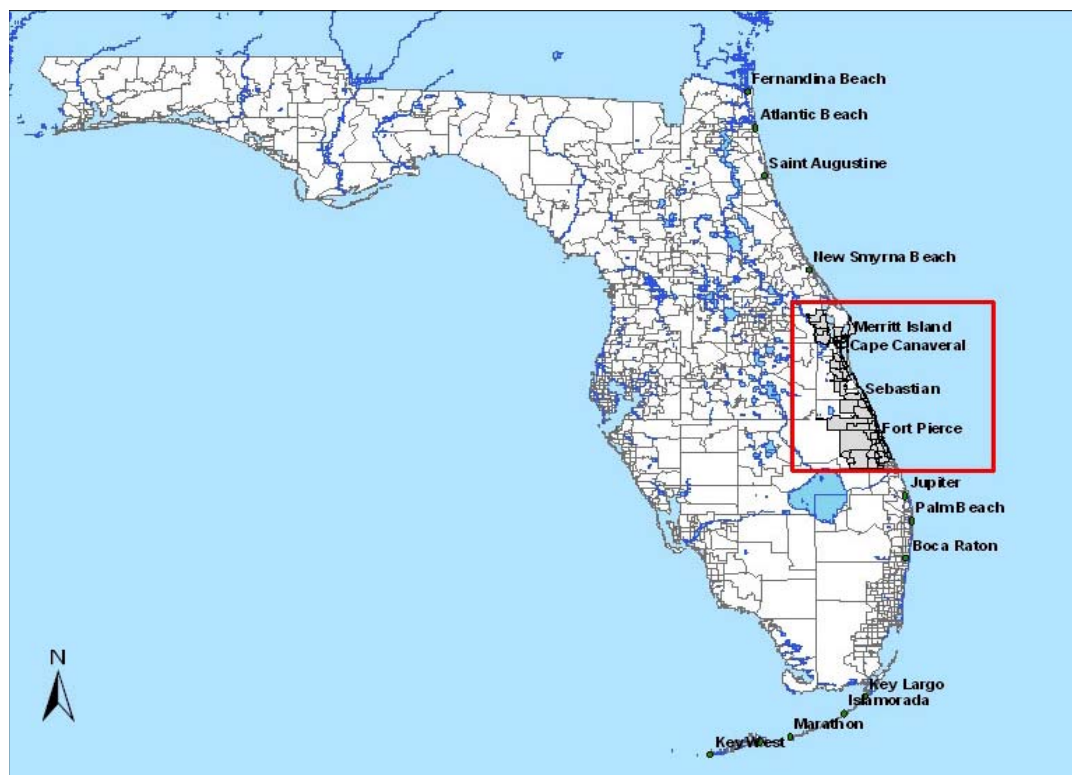


Figure 9. Overview of potentially affected communities for Snapper Grouper Amendment 13A.
Source: Kathi Kitner.

The communities of Cape Canaveral, Merritt Island, Cocoa/Cocoa Beach, Melbourne, Sebastian, Vero Beach, and Ft. Pierce - primarily due to geographic proximity to and historical patterns of fishing in the *Oculina* Bank - have been most affected by these regulations (Figure 9).

To a lesser degree, there may be other communities (inland and or further south, such as Jupiter or West Palm Beach) that have felt some repercussions from the regulations protecting the *Oculina* HAPC and the *Oculina* Experimental Closed Area. Data deficiencies make it impossible to identify such communities at this time. Because the above-named communities are located in such close proximity to the *Oculina* HAPC and *Oculina* Experimental Closed Area, it is logical to assume that those communities will continue to feel most of the impacts of this measure.

The description of the fishing activities in the previous section focused exclusively on the types of fishing that occur in Federal waters. The Fishery Impact Statement and other community analyses also must consider fishing that occurs in state waters when making a determination as to whether the area in question is indeed a fishing community, and if so, what kind. Therefore it is important to note that, in general, the above-listed communities are characterized by a variety of fishing types due to the specific geography of the region.

Fisheries in this section of central Florida generally occur in two different environments. First there is the inshore, river/inlet fishing, which is predominately characterized by recreational fishing. This area encompasses the Indian River, St. Johns River, Banana River and the associated lagoons. The decline of commercial exploitation of the river and lagoon can be traced to the Florida Net Ban of 1994, which prohibited the use of gillnets in state waters. This prohibition has had a profound impact on the commercial fishing industry in general in Florida (Smith et al. 1999). The impact of this legislation, along with the growing dominance of tourism as an industry in the state, and the decline of agriculture (which formed a reciprocal economic relation with fishing and while healthy, kept commercial and residential development at bay, helping to protect the fishermen's access to the waters) has changed forever the face of commercial fishing in the region.

Additionally, many commercial fish houses have gone out of business or have shifted to selling imported products to supplement their local supplies. At the same time, the number of businesses possessing federal dealer permits has increased from about 180 in 1999 to a little over 200 in 2001. There is some industry speculation that the increasing number of dealer permits reflects increased decentralization in the domestic fishing markets.

The second large areal distinction to be described is the ocean, or offshore fishing, which can be further broken down by sector and depth fished, along with gear types employed (Section 3.2.1). This type of commercial fishing also has suffered negative impacts from regulations related to shark fishing and pelagic longlining (see below regarding the increase or decline in numbers and percentages of federal permits from 1998 to 2002).

Whereas the commercial fishing industry is in decline, the charter boat and private recreational sectors appear to be growing and in some instances, thriving. As more people move to Florida and to the coastal regions, more of them are taking to the water, both inshore and offshore. The following italicized text illustrating this degree of growth is excerpted from the Executive Summary of a recent study by the National Fish and Wildlife Service (USFWS 2003):

Human use of the waters of the southeastern U.S. has increased dramatically as a function of residential growth and increased visitation. This phenomenon is particularly evident in the State of Florida. The population of Florida has grown by 124 % since 1970 (6.8 million to 15.2 million, U.S. Census Bureau) and is expected to exceed 18 million by 2010, and 20 million by the year 2020.

According to a report by the Florida Office of Economic and Demographic Research (2000), it is expected that, by the year 2010, 13.7 million people will reside in the 35 coastal

counties of Florida. In a parallel fashion to residential growth, visitation to Florida has increased dramatically. It is expected that Florida will have 83 million visitors annually by the year 2020, up from 48.7 million visitors in 1998. In concert with this increase of human population growth and visitation is the increase in the number of watercraft that travel Florida waters. In 2001, 943,611 vessels were registered in the State of Florida. This represents an increase of 42 % since 1993. The Florida Department of Community Affairs estimates that, in addition to boats belonging to Florida residents, between 300,000 and 400,000 boats registered in other States use Florida waters each year.

The FWC Division of Law Enforcement reported that in 1999, more than one million vessels used Florida's waterways, including over 829,000 State-registered vessels and about 300,000 out-of-State vessels. Boating continues to increase in Florida as evidenced by just over 943,600 State-registered vessels (FWC 2002a) and more than 400,000 out-of-State vessels for 2001.

Much of the affected area's recreational fishing activity has deep historical roots, dating back to when the associated communities became incorporated entities, around the early part of the 1900s. While there are less data on recreational effort in this region of the central east coast of Florida (as is the case on recreational effort nationally), this section contains a review of recreational fishing-related businesses and tournaments to describe this sector as much as possible.

Each of the following sections includes tables on each community's demographics. These have been included so that the reader might attain a better understanding of the range in values of some more critical variables such as poverty status, ethnicity, and occupation. By employing information from some of the Federal and state databases, such as permit files, landings reports, and U.S. Census data, we can build general community profiles that help us to describe the potentially affected communities.

3.2.3.1 Brevard County

3.2.3.1.1 Commercial Sector in Brevard County

Commercial Landings

Federal and state databases can, at this point in time, provide only general information on the most important landed commercial species. Rather than break these landings down by species, weight, value and community, since that picture may not be completely accurate (and may breach confidentiality requirements), we can simply list which species have been landed with the most frequency (snapper grouper species landed in excess of 10,000 pounds and known to occur in the *Oculina* Experimental Closed Area are highlighted in bold type) by weight in the year 2001 (data obtained from <http://www.accsp.org>).

*Communities of Cocoa/Cocoa Beach, Cape Canaveral/Port Canaveral, Merritt Island, Melbourne and Titusville: **Greater Amberjack**, bluefish, bonnethead, catfish, cobia, blue crab, dolphin, **gag**, **snowy grouper**, **yellowedge grouper**, **crevalle jack**, spiny lobster, king mackerel, Spanish mackerel, great barracuda, menhaden, mojarras, striped mullet, white mullet, Eastern oyster, Northern and Southern quahog, blue runners, Atlantic calico scallops, shark (sharpnose, blacknose, blacktip, bull, fine-tooth, hammerhead, sandbar), sheepshead, shrimp (brown, pink, white, rock), swordfish, tilefish, little tunny, and whiting.*

Permits

The number of federally permitted vessels (the Florida state data were not currently available) has declined for Cape Canaveral (Table 16) but has remained stable for Merritt Island (Table 17). Any trend in numbers of permits is hard to determine, as there are other factors affecting how many vessels are homeported in certain communities, such as mobility of boats, the location of fish stocks from year to year, or resettlement of fishermen due to urban and tourist developments on the coast. Figures 10 and 11 show the number of snapper grouper permits (both the 225 pound trip limited permits and the unlimited permits) and location by homeport for the year 2002. As noted in the previous Section 3.2.2, the actual location of vessels shifts throughout the year or from one year to the next. Regardless of these shifts, these geographical representations help to determine where impacts may be felt.

Table 16. Number of federal permits by type for Cape Canaveral, Florida. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Type of Permit	1998	1999	2000	2001
Total permitted vessels	19	6	10	15
Commercial King Mackerel	5	1	1	3
Commercial Spanish Mackerel	8	4	7	8
Commercial Spiny Lobster	1	1	2	3
Charter/Headboat for Coastal Pelagics	2	0	0	3
Charter/Headboat for Snapper Grouper	2	0	0	3
Snapper Grouper Class 1	0	0	1	1
Snapper Grouper Class 2	1	0	0	2
Swordfish	3	0	0	1
Shark	9	1	3	3
Rock Shrimp	10	3	4	4
Federal Dealers	4	3	4	4

Table 17. Number of federal permits by type for Merritt Island, Florida. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Type of Permit	1998	1999	2000	2001
Total Permitted Vessels	7	4	7	8
Commercial King Mackerel	3	3	6	5
Commercial Spanish Mackerel	4	3	2	0
Commercial Spiny Lobster	2	0	0	0
Charter/Headboat for Coastal Pelagics	1	0	1	4
Charter/Headboat for Snapper Grouper	0	0	1	4
Snapper Grouper Class 1	0	0	2	2
Snapper Grouper Class 2	0	0	0	0
Swordfish	2	0	0	0
Shark	4	1	1	0
Rock Shrimp	1	0	0	0
Federal Dealers	1	1	0	0

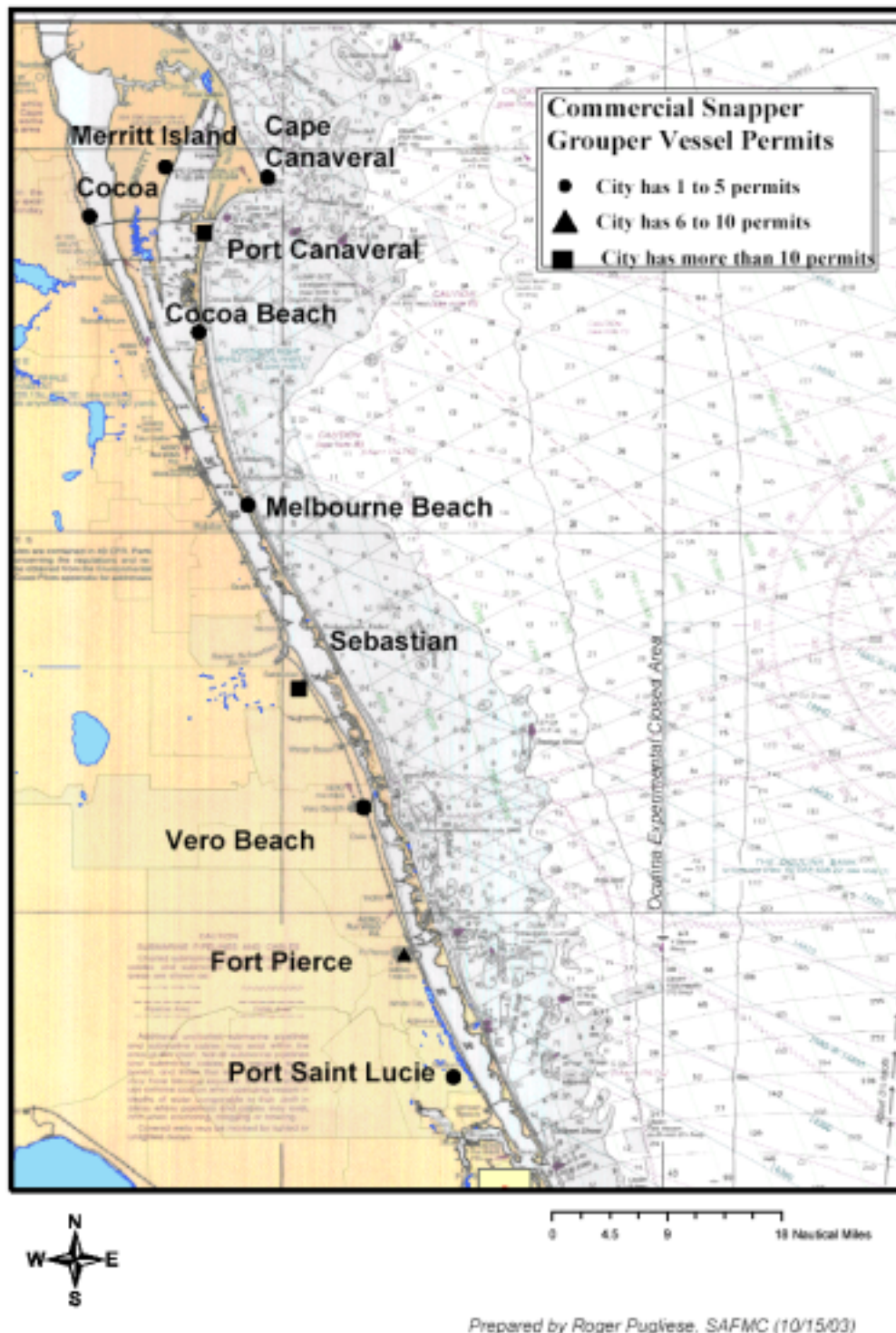
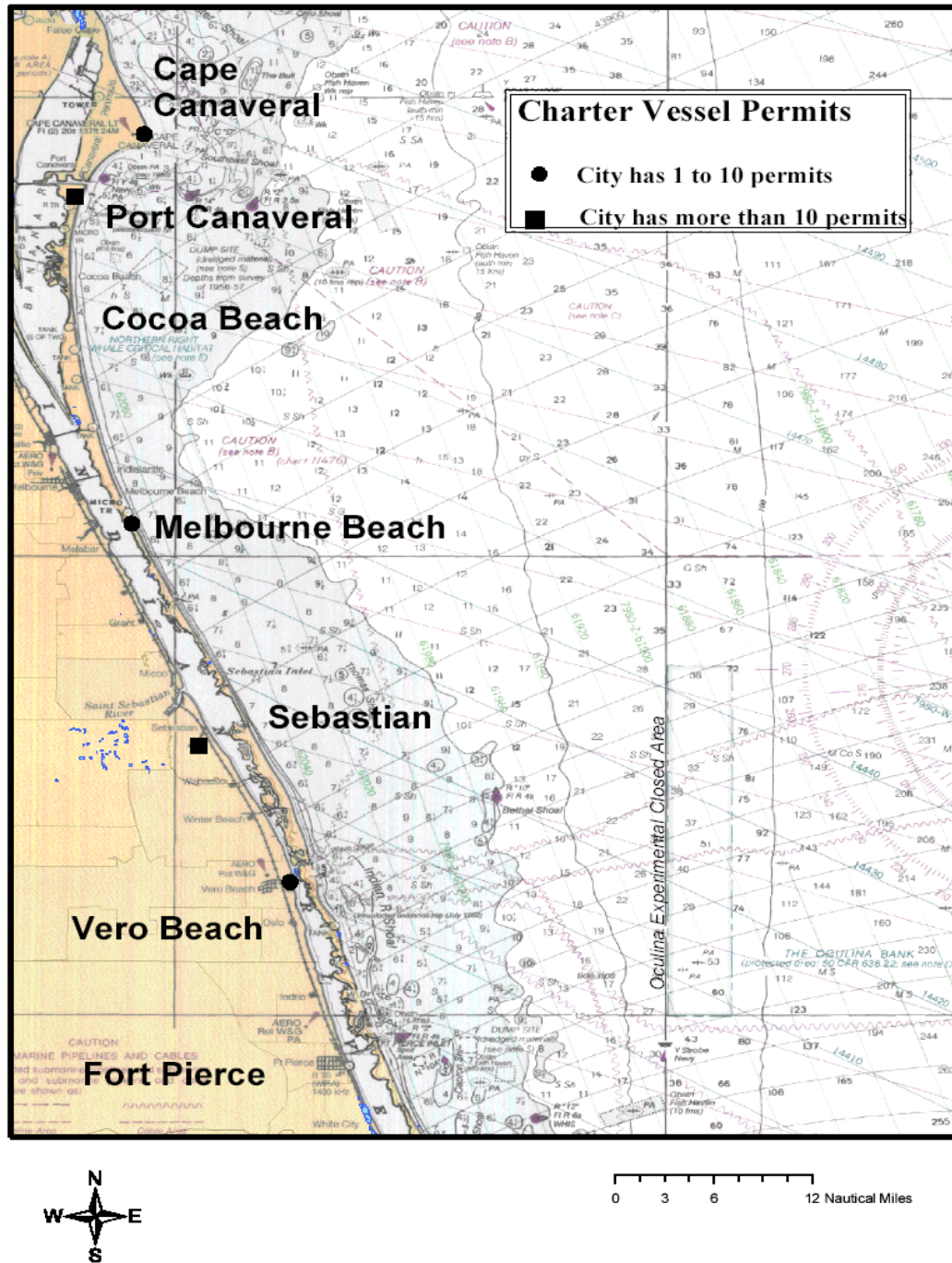


Figure 10. All commercial snapper grouper permits by homeport, 2002. Source: Kathi Kitner.



Prepared by Roger Pugliese, SAFMC (10/15/03)

Figure 11. Number and location of federal snapper grouper charter boat permits in the affected areas, 2002. Source: Kathi Kitner.

3.2.3.1.2 Recreational Sector in Brevard County

Charter Boat and Headboat Sector

As in other coastal areas of Florida, in the communities of Brevard there is a fairly heavy presence of charter boat businesses, private marinas, and other associated businesses catering to the recreational fishing sector. According to Holland et al. (1999), there were approximately 32 charter boats and 2 headboats in the Canaveral/Melbourne area. That is likely a low estimate, as it does not account for the smaller number of for-hire boats possibly present in Merritt Island and in the Cocoa/Cocoa Beach area.

Marinas

According to the Brevard County Marine Advisory Council (<http://www.brevardparks.com/bcmac>, November 2002), there are 70 marinas in Brevard County, ranging from small fish camps with no boat slips to large private clubs that have over 200 wet slips. There are a total of 3,263 wet slips at these 70 marinas. While one cannot determine how many of these wet slips are used by recreational (or commercial) fishermen, it can be used as a very rough indicator of potential recreational fishing effort.

Bait and Tackle Stores

There are approximately 36 bait and tackle stores in Brevard county cities, distributed as follows: 5 in Cape Canaveral, 5 in Cocoa/Cocoa Beach, 1 in Fellsmere, 15 in Melbourne/Melbourne Beach, 4 in Merritt Island, and 6 in Titusville.

Tournaments

The number and location of fishing tournaments may vary from year to year, but the following tournaments seem to have staying power:

- * Seventh Annual Cal Dixon Celebrity Offshore Fishing Classic, May, Sunrise Marina, Port Canaveral
- * Canaveral Kingfish Classic, July, Port Canaveral
- * Coconut's on the Beach Wahoo and Dolphin Shootout, May, Port Canaveral
- * FSFA's Offshore Slam, June, Port Canaveral
- * Rusty's Canaveral Kingfish Challenge, June, Port Canaveral

Additionally, Port Canaveral participates in the newer H.O.T. (Hardcore Offshore Tournaments) Fishing Circuit, a series of 9 offshore, recreational fishing tournaments that occur off Port Canaveral, Sebastian, Ponce, and Ft. Pierce.

3.2.3.1.3 Community Demographics in Brevard County

Community demographics for Cape Canaveral (Table 18) and Merritt Island (Table 19) provide an overview of these two communities.

Cape Canaveral shows a fairly homogeneous, aging population, with those 65 years and older growing from 16.1% of the population to 23.1% since 1990. Overall educational attainment has increased. More persons speak a language other than English at home (an increase of 2.5%), and fewer people have incomes below the poverty line. Unemployment has decreased, but there are fewer in the labor force today than in 1990, again indicating an aging population. The percentage of persons in a service occupation has grown from 14.1% to 20.4%, while there is a decline in the percentage of those in the primary industries of farming, fishing and forestry.

Merritt Island displays characteristics similar to Cape Canaveral. It too is an aging community (numbers of those over 65 years of age increasing, decreasing percent of persons in the labor force), but it exhibits an increase in unemployment and an increase in the percent of incomes falling below the poverty line. As with Cape Canaveral, the percentage of persons employed in the primary industries of farming, fishing and forestry has declined.

Table 18. Community demographics:Cape Canaveral, Florida. Source: U.S. Census Bureau, 2003.

	1990	2000
Total population	8,014	8829
Gender Ratio M/F	107/100	109.1/100
Age (Percent of total population)		
Under 18 years of age	14.0	11.3
18 to 64 years of age	70.0	65.6
65 years and over	16.1	23.1
Ethnicity or Race (Number)		
White	7545	8359
Black or African American	277	126
American Indian and Alaskan Native	102	28
Asian	62	150
Native Hawaiian and other Pacific Islander	0	5
Some other race	28	37
Two or more races*	N/A	124
Hispanic or Latino (any race)	374	307
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	2.7	2.3
Percent high school graduate or higher	83.2	87
Percent with a Bachelor's degree or higher	21.4	25.2
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	7.0	9.5
And Percent who speak English less than very well	0.9	2.2
Median household income	25,499	30,858
Poverty Status (Percent of population with income below poverty line)	16	11.6
Percent female headed household	4.92	7.4
Home Ownership (Number)		
Owner occupied	1802	2526
Renter occupied	2502	2540
Value Owner-occupied Housing (Median \$)	80300	91,600
Monthly Rent (Median \$)	370	564
Employment Status (Population 16 yrs and over)		
Percent in the labor force	70	59.6
Percent of civilian labor force unemployed	6.7	5.3
Occupation		
Management, professional, and related occupations*	N/A	31.9
Service occupations	14.1	20.4
Sales and office occupations*	N/A	24.7
Farming, fishing, and forestry occupations	2.7	0.4
Construction, extraction, and maintenance occupations*	N/A	12.8
Production, transportation, and material moving occupations*	N/A	9.8
Industry		
Agriculture, forestry, fishing and hunting	1.5	0.4
Manufacturing	19.8	10.1
Percent government workers	12.63	13.3
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	10.91	13.1
Percent using public transportation	1.63	1
Mean travel time to work (those who did not work at home)*	N/A	25
Percent worked outside of county of residence*	N/A	8.6

* Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

Table 19. Community demographics: Merritt Island, Florida. Source: U.S. Census Bureau, 2003.

	1990	2000
Total population	32,886	36,090
Gender Ratio M/F	95.2/100	95.3/100
Age (Percent of total population)		
Under 18 years of age	21.4	21.8
18 to 64 years of age	62	58.4
65 years and over	15.4	19.8
Ethnicity or Race (Number)		
White	30,345	32,560
Black or African American	1711	1918
American Indian and Alaskan Native	198	149
Asian	453	597
Native Hawaiian and other Pacific Islander	0	21
Some other race	179	246
Two or more races*	N/A	599
Hispanic or Latino (any race)	1067	1381
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	3.75	2.7
Percent high school graduate or higher	85.5	88.4
Percent with a Bachelor's degree or higher	23.4	28.2
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	12.4	8.2
And Percent who speak English less than very well*	N/A	2.5
Median household income	35,803	45,532
Poverty Status (Percent of population with income below poverty line)	7.1	9.4
Percent female headed household	3.7	10.7
Home Ownership (Number)		
Owner occupied	9673	11,196
Renter occupied	3707	3759
Value Owner-occupied Housing (Median \$)	90,700	118,300
Monthly Rent (Median \$)	482	566
Employment Status (Population 16 yrs and over)		
Percent in the labor force	65	58.4
Percent of civilian labor force unemployed	4.17	5.0
Occupation		
Management, professional, and related occupations*	N/A	39.5
Service occupations	18.6	15.6
Sales and office occupations*	N/A	25.9
Farming, fishing, and forestry occupations	1.4	0.5
Construction, extraction, and maintenance occupations*	N/A	9.1
Production, transportation, and material moving occupations*	N/A	9.5
Industry		
Agriculture, forestry, fishing and hunting	1.8	0.4
Manufacturing	18.0	12.6
Percent government workers	17.2	16.4
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	9.7	9.4
Percent using public transportation	0.2	0.3
Mean travel time to work (those who did not work at home)*	N/A	24.2
Percent worked outside of county of residence*	N/A	7.5

* Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

3.2.3.2 Indian River County

3.2.3.2.1 Commercial Sector in Indian River County

Commercial Landings

The communities of Sebastian and Vero Beach are located in Indian River County. Commercial landings reported are greatest for Sebastian, while landings for Vero Beach are minimal. The greatest landings are for blue crab (14,540 pounds), **gag** (1,985 pounds), king mackerel (56,211 pounds), Spanish mackerel (84,863), striped mullet (67,540 pounds), and white mullet (9,006 pounds).

Permits

The community of Sebastian exhibits a far larger number of federally permitted vessels than does the community of Vero Beach (Table 20). It appears that the number of federally permitted vessels in Sebastian is increasing, however it may be that vessels are simply moving to the community from other areas from which they have been displaced (similar to the case in Ft. Pierce). Two fisheries show a definite decline in numbers, the shark and swordfish fisheries.

The number of federally permitted vessels in Vero Beach is only two: one a charter boat; the other, a charter/commercial snapper grouper vessel. There are no federal dealer permits noted for 2001 in Vero Beach (because of the very low number of permits so table was created for Vero Beach).

Table 20. Number of federal permits by type for Sebastian, Florida. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Type of Permit	1998	1999	2000	2001
Total permitted vessels	69	60	74	71
Commercial King Mackerel	51	50	62	61
Commercial Spanish Mackerel	52	46	56	47
Commercial Spiny Lobster	6	2	7	6
Charter/Headboat for Coastal Pelagics	6	5	7	12
Charter/Headboat for Snapper Grouper	5	5	8	12
Snapper Grouper Class 1	1	11	13	15
Snapper Grouper Class 2	2	8	7	6
Swordfish	6	0	1	2
Shark	23	5	6	6
Rock Shrimp	0	1	0	0
Federal Dealers	2	3	4	2

3.2.3.2.2 Recreational Sector in Indian River County

Charter Boat/Headboat Sector

According to Holland et al. (1999), there were approximately 16 charter boats and zero headboats ported in the Vero/Vero Beach area. Sebastian promotes itself as one of the best snook fishing areas in the world. Recreational anglers there also target redfish, large tarpon, **crevalle jack**, mangrove snapper, bluefish, flounder, drum and sheepshead.

Bait and Tackle Shops

There are approximately five bait and tackle shops in Sebastian and eight in the Vero Beach/Wabasso area.

Marinas

There are 13 marinas identified for Indian River County. There are four in Vero Beach, three in Wabasso, and one in Sebastian. This number does not include boat ramps or other boating access points.

Tournaments

The Indian River County Sheriff's Office Annual Bluewater Tournament is the only known tournament specifically to have a "snapper grouper" category. It is a part of the H.O.T. Fishing Circuit.

3.2.3.2.3 Community Demographics in Indian River County

The community demographics for Sebastian (Table 21) and Vero Beach City (Table 22) provide an overview of these two communities.

Sebastian is similar to Cape Canaveral and Merritt Island in that its population is aging and shows an increase in educational attainment. However, there is also an increase in the percent of persons who speak a language other than English at home and an increase in those who speak English "less than very well". Unemployment has decreased, as has the amount of persons with incomes under the poverty line. The percent of people employed in service occupations has exploded, increasing from 3.4% to 26%. Again, the number of people employed in farming, fishing and forestry has declined.

Vero Beach City exhibits less change in all areas from 1990 to 2000. It appears as a stable community, except for the almost predictable decline in employment in farming, fishing and forestry.

Table 21. Community demographics: Sebastian, Florida. Source: U.S. Census Bureau, 2003.

	1990	2000
Total population	10205	16,181
Gender Ratio M/F	95.7/100	92.1/100
Age (Percent of total population)		
Under 18 years of age	20.6	20.2
18 to 64 years of age	54.6	51.9
65 years and over	24.8	27.9
Ethnicity or Race (Number)		
White	9,938	15,155
Black or African American	108	515
American Indian and Alaskan Native	19	39
Asian	106	120
Native Hawaiian and other Pacific Islander	0	0
Some other race	0	153
Two or more races*	N/A	199
Hispanic or Latino (any race)	183	625
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	7.03	3.1
Percent high school graduate or higher	73.5	82.9
Percent with a Bachelor's degree or higher	9.9	13.9
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	6.0	8.2
And Percent who speak English less than very well	1.5	2.7
Median household income	29,464	39,327
Poverty Status (Percent of population with income below poverty line)	6.8	6.3
Percent female headed household	7.2	9.2
Home Ownership (Number)		
Owner occupied	3407	5937
Renter occupied	737	907
Value Owner-occupied Housing (Median \$)	68,700	94,100
Monthly Rent (Median \$)	449	689
Employment Status (Population 16 yrs and over)		
Percent in the labor force	51.3	52
Percent of civilian labor force unemployed	5.6	3.2
Occupation		
Management, professional, and related occupations*	N/A	23.9
Service occupations	3.4	26
Sales and office occupations*	N/A	27.1
Farming, fishing, and forestry occupations	3.5	0.7
Construction, extraction, and maintenance occupations*	N/A	13.8
Production, transportation, and material moving occupations	N/A	8.5
Industry		
Agriculture, forestry, fishing and hunting	3.7	1.1
Manufacturing	8.2	6
Percent government workers	10.7	11
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	16.31	11.9
Percent using public transportation	0	0
Mean travel time to work (those who did not work at home)*	N/A	23.1
Percent worked outside of county of residence*	N/A	12.9

* Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

Table 22. Community demographics: Vero Beach City, Florida. Source: U.S. Census Bureau, 2003.

	1990	2000
Total population	17,350	17,705
Gender Ratio M/F	91.1/100	92.8/100
Age (Percent of total population)		
Under 18 years of age	15.6	16
18 to 64 years of age	54.5	54.7
65 years and over	30	29.4
Ethnicity or Race (Number)		
White	16,596	16,418
Black or African American	571	606
American Indian and Alaskan Native	25	35
Asian	98	219
Native Hawaiian and other Pacific Islander	0	5
Some other race	60	247
Two or more races*	N/A	175
Hispanic or Latino (any race)	435	1025
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	5.7	6.1
Percent high school graduate or higher	80.5	85
Percent with a Bachelor's degree or higher	23.5	32
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	7.8	10.1
And Percent who speak English less than very well	2.8	3.1
Median household income	26,877	38,427
Poverty Status (Percent of population with income below poverty line)	9.84	9.1
Percent female headed household	4.43	8.6
Home Ownership (Number)		
Owner occupied	5136	5505
Renter occupied	3133	3011
Value Owner-occupied Housing (Median \$)	104,300	144,800
Monthly Rent (Median \$)	411	598
Employment Status (Population 16 yrs and over)		
Percent in the labor force	49	52.9
Percent of civilian labor force unemployed	7.1	3.5
Occupation		
Management, professional, and related occupations*	N/A	33.4
Service occupations	14.5	19.8
Sales and office occupations	N/A	27.3
Farming, fishing, and forestry occupations	2.54	0.8
Construction, extraction, and maintenance occupations*	N/A	11
Production, transportation, and material moving occupations*	N/A	7.6
Industry		
Agriculture, forestry, fishing and hunting	2.4	1.5
Manufacturing	7.43	5.6
Percent government workers	11.7	11.6
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	.01	11
Percent using public transportation	.01	0.5
Mean travel time to work (those who did not work at home)*	N/A	17.7
Percent worked outside of county of residence*	N/A	10.6

* Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

3.2.3.3 St. Lucie County

3.2.3.3.1 Commercial Sector in St. Lucie County

Ft. Pierce, located in St. Lucie County, is the only community to require a description of commercial and recreational fishing activities. The other potentially affected communities in the county, which are located south of Ft. Pierce (Jupiter, Port Salerno, West Palm Beach, Hobe Sound, Stuart, etc.), do not hold a large number of commercial snapper grouper permits. Those same communities hold a moderate number of snapper grouper charter boat permits. At this time, data are not sufficient to enable us to predict how many commercial, charter boat, or recreational fishermen would fish in the *Oculina* Experimental Closed Area were it to reopen to snapper grouper fishing. We do not have reliable data to determine how many individuals fished in that area before it was closed to fishing for snapper grouper species in 1994. Nor have we received comments on the proposed action from people in the communities south of Ft. Pierce. Consequently, those communities are not considered in this analysis.

Commercial Landings

Commercial landings for Ft. Pierce for the year 2001 are much like those of the other communities examined in this document. Bluefish, **crevalle jack**, king mackerel, Spanish mackerel, mojarras, striped mullet, white mullet, fine-toothed shark, small coastal sharks, swordfish, tilefish, and tuna comprised the majority of the catch.

Ft. Pierce's commercial fishing industry has been particularly hurt by the 1994 Florida Net Ban, and effect has been worsened by the newer, more stringent regulations implemented for the longline and shark fisheries. There is talk about developing the waterfront for more tourist-oriented businesses (Kitner 2003). While there are five federally permitted dealers in Ft. Pierce, two of the larger fish houses have discussed leaving the business, and one has recently stopped unloading commercial catches (Kitner 2003). Although some residents still see themselves as part of a fishing community, others believe that those days are gone.

As is the case in other communities that have a history of being commercial fishing ports, some boats have relocated to Ft. Pierce, perhaps believing that its location is more conducive to the commercial fishing business.

Permits

While overall number of federal permits may have increased, it may be a result of fishermen being displaced from other coastal areas undergoing, for example, development and gentrification (Table 23). As is the case in other communities that have a history of being commercial fishing ports, some boats have relocated to Ft. Pierce, perhaps believing that its location is more conducive to the commercial fishing business. Table 23 shows that the number of shark permits has been reduced to less than half its numbers, perhaps reflecting recent management measures.

Table 23. Number of federal permits by type for Ft. Pierce, Florida. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Type of Permit	1998	1999	2000	2001
Total permitted vessels	88	64	81	100
Commercial King Mackerel	54	52	62	71
Commercial Spanish Mackerel	63	59	72	73
Commercial Spiny Lobster	10	8	9	11
Charter/Headboat for Coastal Pelagics	1	0	0	7
Charter/Headboat for Snapper Grouper	1	0	0	6
Snapper Grouper Class 1	5	13	17	18
Snapper Grouper Class 2	2	6	7	7
Swordfish	18	8	8	11
Shark	46	18	18	24
Rock Shrimp	0	0	0	0
Federal Dealers	3	3	3	5

3.2.3.3.2 Recreational Sector in St. Lucie County

Bait and Tackle Shops

While commercial fishing may be declining, the recreational sector appears to be flourishing and increasing in size in Ft. Pierce. There are approximately 11 bait and tackle stores in the immediate area, and Ft. Pierce is home to 11 charter boats and one headboat.

Tournaments

Ft. Pierce is also a part of the H.O.T. Fishing Circuit and is home to the Ft. Pierce Open, in June, the July Bold Water's Wahoo & Dolphin Shootout, and the May Treasure Coast Blue Water Open at the Ft. Pierce City Marina.

3.2.3.3.3 Community Demographics in St. Lucie County

Ft. Pierce displays demographics (Table 24) that perhaps deserve more attention than other communities that may be affected by the proposed action in this document. There is a high number of ethnic minorities (45% African American, 16% Hispanic), high percentage of those with less than a 9th grade education (17.8%), high unemployment (8.8%), and almost 30.9 % of the population has an income below the poverty line. Twenty percent of the households have a female head of household. The primary industries of farming, fishing and forestry still employ about 9% of the population, a figure slightly fluctuating from 1990. These facts show that Ft. Pierce may be highly vulnerable to regulatory actions and should be examined from the point of view of environmental justice in the future. This current Amendment 13A may not be critical for this community but future actions that may intensify cumulative impacts on the community as a whole should be carefully analyzed.

Table 24. Community demographics: Ft. Pierce, Florida. Source: U.S. Census Bureau, 2003.

	1990	2000
Total population	36,830	37,516
Gender Ratio M/F	92/100	97.4/100
Age (Percent of total population)		
Under 18 years of age	26.2	27.2
18 to 64 years of age	55	55.4
65 years and over	19.1	17.5
Ethnicity or Race (Number)		
White	19772	18,585
Black or African American	15604	15,326
American Indian and Alaskan Native	118	122
Asian	198	298
Native Hawaiian and other Pacific Islander*	N/A	30
Some other race	1138	211
Two or more races*	N/A	1144
Hispanic or Latino (any race)	2370	5629
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	18.3	17.8
Percent high school graduate or higher	56.9	59.7
Percent with a Bachelor's degree or higher	11.3	12.7
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	11.6	24.8
And Percent who speak English less than very well	77.1	14.8
Median household income	18913	25,121
Poverty Status (Percent of population with income below poverty line)	29.2	30.9
Percent female headed household	6.87	19.3
Home Ownership (Number)		
Owner occupied	7552	7671
Renter occupied	6619	6736
Value Owner-occupied Housing (Median \$)	56900	62,800
Monthly Rent (Median \$)	401 (324)	517
Employment Status (Population 16 yrs and over)		
Percent in the labor force	54.9	55.1
Percent of civilian labor force unemployed	12.4	8.8
Occupation		
Management, professional, and related occupations	N/A	19.9
Service occupations	15.6	19.3
Sales and office occupations	N/A	20.5
Farming, fishing, and forestry occupations	9.4	9
Construction, extraction, and maintenance occupations*	N/A	15.8
Production, transportation, and material moving occupations*	N/A	15.5
Industry		
Agriculture, forestry, fishing and hunting	9.8	7.8
Manufacturing	7.14	8
Percent government workers	17.7	11.4
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	19.4	22.4
Percent using public transportation	3.14	4
Mean travel time to work (those who did not work at home)*	N/A	24.6
Percent worked outside of county of residence*	N/A	15.2

* Some values could not be determined accurately due to changes in the way the Census Bureau tabulates responses, or to changes in the categories themselves.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This section presents management measures and alternatives considered by the Council and the environmental consequences of management. The Environmental Assessment (EA), Initial Regulatory Flexibility Analysis (IRFA), Regulatory Impact Review (RIR) and Social Impact Assessment (SIA)/Fishery Impact Statement (FIS) are incorporated into the discussion under each of the proposed action items.

The alternatives are listed in Section 4.2 and are followed by five sub-headings: Biological Impacts, Economic Impacts, Social Impacts, Law Enforcement Impacts, and Conclusion. These are self explanatory with the first four presenting the impacts of each alternative considered. The Council's rationale for accepting or rejecting the alternative is presented under the heading "Conclusion".

4.2 Alternatives for the Proposed Action

Alternative 1. **Preferred Alternative** - Extend regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an indefinite period with a 10-year re-evaluation by the Council. The Council will review the configuration and size of the *Oculina* Experimental Closed Area within 3 years of the publication date of the final rule.

Alternative 2. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 10-year period.

Alternative 3. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 20-year period.

Alternative 4. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 50-year period.

Alternative 5. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an indefinite period.

Alternative 6. No action: The regulations that prohibit fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area will sunset on June 27, 2004.

4.2.1 Biological Impacts

Characteristics of the life history of reef fishes make them particularly vulnerable to overfishing. Most large reef fish species are long-lived. For example, many groupers live as long as 25-32 years (speckled hind and yellowedge grouper, respectively), tilefish and blueline tilefish may live 35-42 years and red snapper live up to 53 years (see Section 3.1.2.2). The low natural mortality rates of many species (e.g., 0.1-0.2 per year; Coleman et al. 2000) indicate that, to sustain the species, only a small amount of biomass may be removed each year (Coleman et al. 2000). Recovery from overfishing can therefore take many years.

The sexual strategies of these species are also easily disrupted by fishing pressure. Many snapper grouper species change sex from female to male later in life, including knobbed porgy, red porgy, and most grouper species (see Section 3.1.2.2). Fisheries that target large fish may

therefore selectively deplete males from the population, and “if sex change is size- or age-related, then fishing in this manner could be selecting against recovery by removing the age or size classes in which sex change occurs” (Coleman et al. 2000).

Many fisheries target the largest individuals, which are also the oldest fish. These fishes have much greater reproductive potential than smaller fish that are also sexually mature. For example, one female red snapper at 61 cm (24 in) contains as many eggs as 212 red snapper at 42 cm (16.5 in), and one gag at age 8 produces as many eggs as 48 gag at age 3 (Coleman et al. 2000). Fishing pressure that removes the largest individuals therefore reduces the reproductive potential of the population by a large degree.

Many large reef fishes also behave in such a way that they are relatively easy to catch. They exhibit strong site fidelity and, when spawning, aggregate in large groups in the same places each year. These behaviors make targeting them with sophisticated electronic equipment very efficient (Coleman et al. 2000). All of these factors make reef fishes particularly vulnerable to overfishing, and managers should consider these factors when making regulatory decisions. Coleman et al. (2000) conclude that marine protected areas such as the *Oculina* Experimental Closed Area are an important tool for conservation of marine fishes.

Based on the limited information, there appear to be some encouraging signs of positive biological impacts from the nine years the prohibition of fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area has been in effect. A study conducted in 2001 found that, in the few areas where habitat remained intact, there were more and larger groupers than observed in a 1995 study, and male gag and scamp were also common (Koenig 2001). The observation of male gag and scamp is particularly of interest because size, age and proportion of males of these species have declined both in the Gulf of Mexico and South Atlantic regions (Koenig 1996; Coleman et al. 1996; McGovern et al. 1998; Koenig et al. 2000 in Koenig 2001). Other encouraging signs include the observation of juvenile speckled hind, which is a candidate species for listing under the Endangered Species Act

The purpose of continuing the regulations within the closed area is to provide a hedge against uncertainty in the future health of snapper grouper populations given environmental fluctuations, stock assessments’ inherent uncertainty, and managers’ limited ability to control fishing effort. Apart from this hedge against future uncertainty, the Council’s intent is to provide the highest degree of protection to *Oculina* coral and habitat functions from live and dead coral in the closed area, which has been severely damaged from bottom fishing gear. The success of recovery efforts for snapper grouper species is dependent on the success of *Oculina* coral restoration, as this coral provides essential habitat for these fishes. Prey species could decrease in abundance within the *Oculina* Experimental Closed Area as snapper grouper populations recover. This would not be perceived as an adverse impact, but rather as an ecological benefit, as it would indicate that the reef fish community is in the process of recovering to a natural predator-prey balance.

The no action alternative (Alternative 6) would not meet the Council’s purpose and need. Eliminating the regulations that prohibit fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area on June 27, 2004 would likely result in the depletion of snapper grouper populations within the closed area. Some species appear to have begun to recover within the affected area, and if the area opened any gains made during the previous decade would be lost. Additionally, it would eliminate potential future benefits to regional snapper grouper populations associated with the spillover effects described in Section 3.1.2.4.3.

Allowing these regulations to expire also could result in adverse impacts to *Oculina* coral. The lead weights or sinkers commonly used by vertical gear fishermen to transport baited hooks to the ocean bottom can break off branches of *Oculina* coral. Additionally, fishing line is easily entangled amongst the branches of *Oculina* thickets, which can result in fragmentation of *Oculina* colonies. *Oculina* coral fragments may continue to survive after an impact (Brooke 1998). However, impacted colonies are more vulnerable to sediment loading, and feeding and spawning process can be negatively impacted if the corals are reduced in height. High-relief coral colonies can more easily feed due to exposure to nutrient-loaded currents, which also facilitate dispersal of gametes during reproduction. Direct adverse impacts to *Oculina* coral could result in indirect adverse impacts to the associated finfish and invertebrates described in Section 3.1.2 by reducing the amount of surface area available to these species. The value of intact *Oculina* coral thickets as habitat to snapper grouper species is evident in Figures 6-8 (Koenig et al. in press).

Alternatives 1-5 would meet the Council's stated purpose and need to varying degrees. However, given the absence of quantitative information on the recovery rates of affected snapper grouper species and on the potential spillover benefits associated with the closure, the appropriate amount of time for closure cannot be determined with certainty. Alternatives 2, 3 and 4 would specify that the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area sunset after 10, 20 or 50 years, respectively. These alternatives would not require a re-evaluation of the regulations until the sunset date, at which time the Council could decide to extend them for an additional period of time. If the Council decided at that time that continued benefits depended on extending the regulations for an additional period of time, it would have to propose such an extension through a plan amendment. This is a lengthy and expensive process which takes time and monies away from other Council actions, and if it were not finished before the sunset deadline, then the affected snapper grouper species and coral would be vulnerable to fishing for a period of time until the regulations proposed in the amendment were implemented.

Alternative 5 would extend the regulations for an indefinite period of time, and would not require a re-evaluation. Alternative 1 also would extend the regulations that prohibit fishing for and retention of snapper grouper species in the *Oculina* Experimental Closed Area for an indefinite period of time. Similar to Alternative 5, Alternative 1 would not specify that the regulations expire on a specific date; rather they would have to be eliminated through an amendment to the Snapper Grouper FMP. Alternative 1 differs from Alternative 5 in that it would require the Council to review the size and the configuration of the *Oculina* Experimental Closed Area (the area in which the regulations that prohibit fishing for and retention of snapper grouper species are in effect) within three years of the publication date of the final rule implementing this amendment. In addition, Alternative 1 would require the Council to re-evaluate the regulations after a ten-year period. This is the Council's preferred alternative because it extends protections to *Oculina* and to affected snapper grouper species, and also specifies the earliest scheduled review of the regulations without the need for a new amendment.

As discussed in Section 3.1.2.4.3, protecting snapper grouper species within the *Oculina* Experimental Closed Area from fishing pressure should provide positive biological impacts by assisting in buffering regional populations from the unintended or unforeseen consequences of fishery management. The preferred alternative is expected to provide the greatest biological benefits, as it would implement this buffer indefinitely. While Alternative

5 also would extend the regulations for an indefinite period of time, the ten-year re-evaluation period in Alternative 1 allows the Council to be adaptive in the management of this unique area without the constraints of having to prepare and submit a plan amendment to ensure the protection remains in place if necessary. In addition, it is the Council's intent to develop an evaluation plan with needed research and monitoring studies as well as enforcement and outreach programs within one year of the implementation date of the final rule. By conducting research and promoting enforcement and awareness of the closed area there may be increased public support and, therefore, more protection of the snapper grouper species and the *Oculina* coral within the closed area due to a decrease in illegal fishing.

Providing that protection is continued where necessary and appropriate for snapper grouper species and *Oculina* coral, reviewing the size and configuration of the *Oculina* Experimental Closed Area within three years of the publication of the final rule will not have negative biological impacts. There is disagreement as to how much *Oculina* coral remains intact in the closed area (and in the greater HAPC). A review of the extent of intact habitat would ensure that the Council's regulations provide the best chance to protect snapper grouper species and *Oculina* and its associated habitat function. The choice of ten years until the next review of regulations is appropriate, given what we know about the biology of affected snapper grouper species and of *Oculina* coral. It is unlikely that the system could fully recover within ten years, as *Oculina* coral grows very slowly (1.5 cm/year), and most of the original coral has been reduced to rubble. Fishes are associated with only intact habitat. Therefore, it may take decades before the impacts of the closed area on some populations can be observed (Reed 1981; Koenig 2001).

Because stock assessments are not available for most species in the complex, and many future stock assessments will likely be limited by a lack of data for poorly understood species, the status of many species relative to reference points for sustainability will likely remain unknown. The proper amount of time needed for rebuilding fish stocks and restoration of *Oculina* coral is therefore also unknown. The United States adopted the Precautionary Approach in the U.N. FAO Code of Conduct for Responsible Fisheries in 1995. The Precautionary Approach, as applied to fishery management is based on the principle that the limits of our knowledge require being cautious about levels of fishing.

The Code states "the absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species and non-target species and their environment" (Article 7.5). Based on this guidance, and the noted lack of information, the Council believes it is prudent to adopt an indefinite closure of the *Oculina* Experimental Closed Area, with re-evaluation in ten years.

Biological Impacts on Listed and Candidate Species Occurring in the *Oculina* Experimental Closed Area (For more information, the reader is referred to the Biological Evaluation in Appendix C.)

Effects on Listed Marine Mammals

Currently, with the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area, the fishery conducted within this area consists of trolling for pelagic species. The Council's preferred alternative would extend the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area for an indefinite period with a 10-year re-evaluation by the Council. As such, trolling for pelagic species would continue as the fishery conducted within

the closed area. Alternatives 2 through 5 would also extend the prohibition on fishing for and retention of snapper grouper species within the closed area for at least an additional 10-year period or more. Under Alternative 6 - no action regulations on the prohibition of harvesting snapper grouper species within the *Oculina* Experimental Closed Area would “sunset” on June 27, 2004. This latter alternative would allow for the harvest of snapper grouper species within the closed area. Traditionally, deepwater snapper grouper species are targeted by bottom fishing with vertical hook-and-line gear (primarily using electric or hydraulic reels known as “bandit” gear).

Due to the low risk of interaction with marine mammals, the southeastern U.S. Atlantic pelagic hook-and-line fisheries are listed as Category III fisheries under the Marine Mammal Protection Act. Category III fisheries are described under the MMPA as having “a remote likelihood of, or no known incidental mortality and serious injury of marine mammals”. NOAA Fisheries has received a few reports of whale entanglements in hook-and-line gear but, on further examination of these events, the whales appeared not to have been injured or were able to disentangle themselves from the gear. Due to the infrequency of known interactions of marine mammals with hook-and-line gear, the potential for adverse effects from hook-and-line fisheries within the *Oculina* Experimental Closed Area is considered discountable.

Effects on Sea Turtles

Sea turtles are known to transit through the region, which includes the *Oculina* Experimental Closed Area. In some cases, turtles may remain in the area for extended periods of time (see Figure 2 in Appendix C). Currently, the hook-and-line fishery within the *Oculina* Experimental Closed Area is executed by trolling. To date, there has not been a report of an incidental capture of a turtle via trolling. Though a potential may exist, the risk is considered low as the speed at which the bait is pulled through the water is generally faster than a turtle can easily catch. Due to the lack of evidence showing interactions of trolled gear with sea turtles together with the low risk of turtles retrieving bait off a trolled hook, the potential for adverse effects from the hook-and-line fishery currently conducted within the closed area is considered discountable. The Council’s preferred alternative would extend the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area for an indefinite period with a 10-year re-evaluation by the Council; thus trolling for pelagic species would continue as the fishery conducted within the closed area. Alternatives 2 through 5 would also extend the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area for at least an additional 10-year period or more. Under Alternative 6 - no action, regulations on the prohibition of harvesting snapper grouper species within the *Oculina* Experimental Closed Area would “sunset” on June 27, 2004. The latter alternative would allow for the harvest of snapper grouper species within the closed area. Traditionally, deep-water snapper grouper species are targeted by bottom fishing with vertical hook-and-line gear (primarily using electric or hydraulic reels known as “bandit” gear).

Bottom fishing with vertical hook-and-line gear may present more of a risk for sea turtles as the turtle may be more capable of biting the bait and become incidentally hooked. Data on sea turtle interactions with hook-and-line gear in the southeastern Atlantic are scant. The NOAA Fisheries Southeast Fisheries Science Center (SEFSC) has initiated a program to collect information on the type and amount of marine discards occurring within the snapper grouper fishery in the southeastern United States. The discard survey is supplemental to the

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existing logbook program, which selects a sub-sample of 20% of the vessels permitted within the fishery to report. In the southeast Atlantic, a total of 26,114 trips reported using handline or “bandit” gear for the period 8/1/01 through 7/31/02. Of these, 2,028 (8%) trips reported discard data. Only four (0.2%) of the trips for which discards were reported included an interaction with a sea turtle. All four trips reported incidentally capturing one turtle during the duration of their trip and releasing the turtle alive. [Data from J. Poffenberger, SEFSC]

Though information on sea turtle interactions with vertical hook-and-line gear is limited, such interactions do occur. Consequently, Alternative 6 would provide much less biological protection to sea turtles than the other alternatives.

Effects on Candidate Species

Snapper grouper species on the “candidate” species list would also benefit from the continued prohibition on the fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area. Two of the four “candidate” snapper grouper species, Warsaw grouper and speckled hind, regularly occur within the *Oculina* Bank area while Goliath and Nassau groupers may potentially occur in the area given their range and habitat preferences. Juvenile speckled hind have also been observed in *Oculina* thickets suggesting that this habitat may also function as a nursery for this species. Moreover, in addition to the snapper grouper species described above, several other “candidate” species are documented to occur in the affected area. These include the dusky shark, *Carcharhinus obscurus*; sand tiger shark, *Odontaspis taurus*; and night shark, *Carcharhinus signatus*. Continued prohibition on the harvest of deep-water snapper grouper species may also benefit these species as sharks can be caught by bottom fishing hook-and-line gear.

Measures to further the conservation and enhance the recovery of these “candidate” species, such as extending the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area beyond its “sunset” date, may aid in preventing them from being listed in the future.

4.2.2 Economic Impacts

The preferred alternative will allow for the continuation of the closed area for an indefinite period of time. It should be noted that the indefinite time period does not imply that the closure would be permanent. It is the Council’s intent that the closure be re-evaluated ten years after the extension is approved. Also, after a period of three years following the publication of the final rule, the Council will review the configuration and size of the closed area. Further, modification of the closure can be accomplished at any time in the future pending adequate Council action.

Section 3.2.2 contains a typology and definition of the economic costs and benefits that pertain to the snapper grouper fishery in the South Atlantic and to the management measure under consideration. This economic impact subsection first begins with a general discussion of the likely economic benefits from the alternatives proposed for the *Oculina* Experimental Closed Area (the closed area). Then, there is a discussion of the costs to society (forgone use benefits) from a continuation of the closure. This is followed by a section on the economic effects of snapper grouper fishing in the “area of interest”. Lastly, there is a comparison of the alternatives.

Economic Benefits of the Closed Area

The primary purpose of this proposed measure is to provide continued protection of snapper grouper populations and associated *Oculina* coral. This closure will provide a hedge against uncertainty in the future health of the snapper grouper populations given environmental fluctuations,

stock assessments' inherent uncertainty, and managers' limited ability to control fishing effort. In fact, this precaution has been cited by other researchers as one of the main benefits of marine protected areas (Lauck et al. 1998; NRC 2001). Snappers and groupers are long lived, slow growing species that are susceptible to collapse from overfishing. Previously, many of these species in the South Atlantic were classified as overfished and the Council took action to rebuild these stocks (refer to the history of management section, Section 1.5). Currently, the status of many of the species in the South Atlantic is unknown, and these status determination criteria will be addressed in a subsequent amendment (Amendment 13B to the South Atlantic Snapper Grouper Fishery Management Plan). Because of these factors, it is likely that there will be economic benefits from taking this precautionary action. The value of this "insurance" will depend on the relative health of fisheries inside and outside of the closed area. As populations increase outside of the area, the economic value of this "insurance policy" will decrease (*ceteris paribus*). However, as populations decrease outside the area, relative to the populations inside of the closed area, the value of this insurance will increase.

Apart from this hedge against future uncertainty, the Council's intent is to provide the highest degree of protection to *Oculina* coral and associated habitat functions in the closed area, which has been severely damaged from bottom fishing gear. Koenig (2001) found that 90% of the *Oculina* habitat has been reduced to rubble. As previously discussed in Section 3.2.2, it is expected that there will be non-use value for the *Oculina* coral habitat itself. As the coral and associated habitat recovers from damage and abundance increases, the theory of diminishing marginal utility dictates that non-use benefits to society will increase at a decreasing rate until satiation is reached, provided all other conditions remain constant (*ceteris paribus*). After this state of the resource is achieved any further improvement will not yield an increase in net economic benefits.

There are other expected economic benefits from closing an area to fishing. These could be realized from additional protection of nursery and spawning grounds and other sensitive habitats. Modern fishing practices can reduce the productivity by physically damaging and altering structurally complex benthic habitats and communities which provide food and shelter to larvae and juveniles. There is evidence to show that ecological conditions improve in an area that is closed to fishing (NRC 2001; Sanchirico 2000). There is evidence to suggest that *Oculina* and associated habitat attracts groupers, snappers, and amberjack, and may be sites of grouper spawning aggregations. Also, ROV observations indicate that there was an increase in grouper numbers since the area has been closed to snapper grouper fishing. The researchers noted an increase in the abundance of male gag and scamp, and surmised that there is a reoccurrence of spawning aggregations of both species. These scientists also observed juvenile speckled hind in *Oculina* thickets, suggesting a nursery function for this species (Koenig 2001).

Preservation of marine ecosystems and biological diversity inside the closed area will provide non-use value to society. As in the case for the non-use value of coral resources, over time, if diversity of the species complexes in the closed area increases, it is expected that non-use benefits will increase at a decreasing rate. Similarly, the non-use value of the snapper grouper species and other species inside the reserve will also increase at a decreasing rate (under the assumption that fisheries populations increase over time in the closed area). Determining the non-use value of many environmental resources is a complex endeavor since these assets are not traded in the marketplace. In these cases, economists utilize a number of sophisticated non-market valuation techniques to express these values in monetary terms. Such techniques have yet to be applied to determine the non-consumptive, non-use, and indirect use benefits from *Oculina* coral and associated habitat.

In some cases marine protected areas (MPAs) can result in increased economic benefits outside of the closed area. Closing off part of the fishing grounds will shield a fraction of the

population from impacts of fishing and act as a source of fish biomass by dispersing eggs, larvae, juveniles and adult fish into the open fishing areas (the spillover effect). In the case of the *Oculina* Experimental Closed Area, most of the benefits will likely come from larval dispersal since most reef-fish tend to have a high degree of site fidelity (NRC 2001; Sanchirico 2000). Also, by limiting the proportion of the population exposed to exploitation, MPAs can help restore the population's truncated age and size structure and aid in the preservation of the population's genetic variability (NRC 2001; Sanchirico 2000). Economic benefits (use, non-consumptive and non-use values) attributed to these ecological services will increase only if there are improvements in the age/size structure of the fish populations and/or incremental increases in the overall stock sizes. Furthermore, the magnitude of these incremental benefits will depend on the relative health of the fisheries inside and outside of the closed area. As populations increase in the closed area, it is expected that the biological benefits from these ecological services will increase. However, the incremental economic benefits from this enhancement effect will depend on the condition of the stock outside of the area. For example, at very low population levels outside the closed area, the economic benefits derived from this enhancement effect will be higher than if the population was healthy outside the closed area, *ceteris paribus*.

Economic Costs of the Closed Area - Forgone Use Benefits

There are economic costs (forgone use value) to society from the creation and continuance of a closed area. It is assumed that a continuation of the moratorium on snapper grouper fishing in the closed area will have an impact on: (1) recreational fishermen who are likely to launch their vessels from the "area of interest" and "deep troll" using planers; (2) commercial snapper grouper fishermen who "motor fish" and home port their vessels in the "area of interest"; and (3) charter operators with snapper grouper permits who are not constrained by the anchoring prohibition and also home port their vessels in the "area of interest" (refer to Section 3.2.2 for a description of these entities). Thus, these opportunity costs will take the form of forgone non-market use benefits (consumer surplus) in the private recreational sector, forgone net revenue (profits) in the commercial harvesting sector and forgone net revenue (profits) in the charterboat sector.

The opportunity cost of a good or service is the foregone value of not using the good or service in its next best alternative. When evaluating the benefits that a marine reserve provides, analysts should measure the net change in benefits (and opportunity cost) rather than the total value of the marine reserve since it is unlikely that these benefits (and opportunity cost) will completely disappear in the absence of the marine reserve.

Provided other conditions remain constant, as populations within the closed area increase and show improvements in the age/size structure, these foregone use benefits (opportunity costs) will increase at a decreasing rate. However, in any time period, the forgone value (opportunity cost) that results from keeping this area closed will depend on the expected economic value of other sites outside of the closed area. The expected value of these other sites will be partly dependent on the status of snapper grouper populations. In addition, there are other quality determinants that affect site choice. For example, on a given trip, commercial fishermen will weigh the travel and other costs against the potential catch rate of various sites and choose the one with the highest expected net value.

There are other costs from closing an area such as the resultant displacement of effort outside of the area which can increase costs to the industry from congestion effects. Displacement to other fisheries can also reduce net total economic benefits in those fisheries (if they are fully or overcapitalized). In some cases there may be a reduction in overall effort in the fishery. These economic effects may have occurred when the *Oculina* Bank HAPC was first created and after

subsequent management actions such as the prohibition on possession of snapper grouper species taken from the closed area (Amendment 6; SAFMC 1993).

Current Economic Benefits from Snapper Grouper Fishing in the Area of Interest

In an effort to put the short-term forgone economic use benefits (opportunity costs) into context, the current economic benefits that are derived from snapper grouper fishing in the “area of interest” are presented in the Tables 25a, 25b and 25c. It must be noted that these estimates are not the short-term forgone benefits from a continuation of the snapper grouper prohibition in the closed area. The majority of the data used in these calculations were described in Section 3.2.2.

Table 25a. Estimate of net revenue and economic impact derived from snapper grouper trips in the EEZ for the charter sector in the area of interest.

- 34.06 % ($94/(90+92+94)$) of all snapper grouper permitted for-hire vessels on the Atlantic coast of Florida were home ported in the area of interest in 2002 (Table 9d).
- 39,478 is the average of all snapper grouper charter catch trips in the Florida EEZ during the period 2000-2002 (Table 7b).
- 13,445 ($34.06 \times 39,478 / 100$) is the estimated number of charter catch trips in the EEZ attributed to the 94 vessels in the “area of interest” per year.
- \$138.33 is the inflation adjusted charter fee per person per trip (Table 10a).
- Estimated gross revenue is \$1,859,985 ($13,446 \times \138.33) annually.
- \$41,878 was the average annual expenditure per vessel in Florida for fuel and oil, bait, food and drink, ice and wages and salaries in 1997 (Holland et al. 1999) adjusted for inflation to 2001 dollars.
- \$62.13 ($\$41,878 / 674$) is the average charter trip expense assuming that each charter vessel makes 674 person trips per year (Holland et al. 1999).
- Estimated trip expenditure for the 94 vessels in the area of interest is \$835,363 per year.
- Estimated net annual revenue is \$1,024,622 for the 94 vessels in the area of interest that is derived from snapper grouper charter trips in the Florida EEZ.

Table 25b. Estimate of net economic benefits derived from snapper grouper private recreational fishing catch trips in the EEZ.

- 307,514 is an average of snapper grouper private recreational catch trips in the Florida EEZ during the period 2000-2002 (Table 10b).
- Assume 34.06 % of all snapper grouper private recreational catch trips in the EEZ off Florida are taken by vessels launched from sites in the “area of interest”. This was the proportion of charter vessels in the area of interest.
- 104,739 is an annual estimate of the snapper grouper catch trips in the Florida EEZ taken by vessels launched from sites in the “area of interest”.
- \$13.80 is the inflation adjusted estimated value of access to snapper grouper recreational fishing on the east coast of Florida (Haab et al. 2001).
- \$1,445,398 (104,739x\$13.80) is an estimate of annual net economic benefits (consumer surplus).
- Annual recreational fishing expenditures for private/rental boat anglers on snapper grouper catch trips in the EEZ off Florida is \$11,347,254 (Table 10b).
- Applying the same percentage (34.06%) to the total private recreational expenditures in the EEZ off Florida yields an estimate of \$3,864,875 for the “area of interest” per year.

Table 25c. Estimate of net revenue derived from snapper grouper for the commercial harvesting sector in the area of interest.

- 120 snapper grouper commercially permitted vessels on the Atlantic coast of Florida are home ported in the area of interest in 2002 (Table 11c).
- This represents 33.71% (120/(120+87+149)) of all permitted vessels on the east coast of Florida (Table 11c).
- \$3,839,320 is the average annual ex-vessel revenue for all commercial snapper grouper species landed on the east coast of Florida during the years 1999, 2000 and 2001.
- Estimated gross revenues for 120 commercial vessels in the area of interest is \$1,294,153 per year (\$3,898,320 x .3371).
- Routine trips costs was calculated to be 21.56% (3,779x100/17,526) of gross revenue for mid shelf snapper grouper trips in the southern area (Waters et al. 2000).
97 boats - landings valued at \$1.7 million = \$17,526 per vessel
average revenue per year after deducting routine trip costs was \$13,747
Routine trip costs per year per vessel \$3,779.
- Estimated annual net revenue after deducting trip costs except wages \$1,015,133 (\$1,294,153 x 0.2156).
- Rhodes et al. (1996) estimated that the boat’s share amounted to an average of 31.4% of the revenue after deducting routine trip costs.
- Estimated annual net revenue when crew and captain’s wages are deducted is \$318,747 in 2001 dollars (1,015,117 x 0.314).

The ensuing summary pertains to recreational and commercial entities operating out of the “area of interest”. The estimated annual net economic benefit that the charter sector derives from snapper grouper fishing in the Florida EEZ is \$1.03 million (Table 25a). The non-market benefit (consumer surplus) from snapper grouper fishing in the EEZ is \$1.45 million for the private recreational fishing sector (Table 25b). The net revenue in the commercial harvesting sector from snapper grouper species in Florida is estimated at \$0.32 million (Table 25c). It is expected that these entities also derive economic benefits from participating in other fisheries in Florida.

Even if it is assumed that fishing trips in the closed area could yield higher net economic benefits to all sectors at this time, the current forgone benefits from fishing in this closed area are expected to be smaller in magnitude than described for the “area of interest” under the assumptions that:

1. Not all vessels home ported or launched from the “area of interest” would likely fish in the closed area should it reopen.
2. For these vessels, fishing effort in the closed area is only a portion of their effort in Florida (commercial harvesting sector) or the Florida EEZ (recreational and for-hire sectors).
3. The incremental value from opening the area would depend on whether there is increased effort in the snapper grouper fishery overall or a displacement of effort from outside the area into the closed area.

Comparison of the Alternatives

The preferred alternative will continue to provide protection of snapper grouper populations and the *Oculina* coral which has been designated as an HAPC for many of the species in the deepwater complex of the snapper grouper fishery. Additional species, such as gag, aggregate in this area to spawn. The economic value of these ecosystem services and those described in the previous paragraphs could not be quantified due to data limitations, but their importance is recognized, not only in relation to harvested species but to other species that only have non-use value.

Apart from the no-action alternative, the other alternatives specify different periods for extending the closure: Alternative 2 for a 10-year period; Alternative 3 for a 20-year period; Alternative 4 for a 50-year period; and Alternative 5 for an indefinite period (without the evaluation criteria specified in the preferred alternative). The description of the benefits and costs of extending the closure as described in the previous section would apply to these alternatives. There is a need to investigate the stream of discounted expected benefits and costs as specified by the time horizon of each alternative. These alternatives could then be ranked based on the value of the net economic benefits. At some point net economic benefits are optimized (MEY) at a sustainable level. Usually, this optimum occurs when fish populations are less than or equal to the MSY stock size, and the habitat is considered to be “recovered”. The data and models that would indicate the “optimal” closure period to achieve the goal of maximizing net economic benefits are not available. If these tools were available, it would be possible to rank these alternatives based on their respective net overall economic benefits to society.

Although it is expected that there would be some incremental net economic use benefits if the closed area reopens (Alternative 6). The magnitude of these effects is unknown even in the short-term. If the no action alternative was chosen, in the medium and long-term, fishing effort could deplete stocks of species in the deepwater snapper grouper complex within the closed area. Many of these deepwater species are very susceptible to overfishing and while the stock status for some populations is unknown, the Council is considering other precautionary action(s) in Snapper Grouper Amendment 13B. The scarcity of *Oculina* coral and the uniqueness of the associated species

assemblages lend support for the assumption that the current non-use value from keeping the area closed is fairly substantial. In addition, it can be assumed that significant fishing effort in this area would lead to a reduction of these non-use benefits and indirect use benefits from further habitat degradation. Taking these factors into consideration, and the value of continuing this closure, as previously described, it can be concluded that at this time other alternatives are superior to the no action alternative.

4.2.3 Social Impacts

Creating the *Oculina* Experimental Closed Area has been, and continues to be, one of the more controversial actions that the Council has taken. This opposition mirrors some of the public's negative response to marine protected areas in a general sense. This response has not faded in the ten years since creation of the *Oculina* Experimental Closed Area, and there is still significant opposition to the measure from fishermen of all sectors in the central Florida area. Fishermen's opposition is rooted in three perceived problems related to the *Oculina* Bank in general, and particularly for the experimental closed area: 1) perceived or observed lack of enforcement of the regulations creating and maintaining the protected area; 2) lack of understanding and/or confusion by fishermen about the original scientific role and need for the closed area; and 3) the growing perception that there are dwindling areas in which to fish for a growing number of recreational fishermen. This last factor is magnified by the restrictions on fishing by current regulations (limited entry, size, bag and trip limits, etc.) in the snapper grouper fishery specifically (see Section 1.5), and other federal and state fishery restrictions in general.

There are roughly three positions taken by the public with regard to the *Oculina* Experimental Closed area (and by extension, the protection of the Bank itself). First, there is the belief that it does not "work" and is therefore a waste of government/managers time to continue the restrictions/prohibitions on fishing for snapper grouper species. People who take this position claim to not have seen any increase in fish stocks (no spillover) in the past ten years, and therefore see the Bank as a government boondoggle. Second, there is the position that because the *Oculina* Bank has been so decimated by other types of activities (e.g., trawling, bottom tending gear, military maneuvers), the protected area's size should be reduced and some "bottom should be returned to the fishing community". Third, there is a group that claims to have been impacted to varying degrees by creation of the protected area, but they have adapted to the closure and now see it as a neutral or even beneficial entity, and something that should continue to be protected. A subset of this group are those who see the *Oculina* as a unique habitat that should be protected for the [non-use] benefit of all peoples, and should serve as something to bequeath to future generations (a legacy or heritage benefit). All of these positions are held variously by different public sectors, and it is not possible to assign exclusively one fishing or political sector to one position or the other.

There is a further complication in analyzing potential social impacts in that the proposed regulation has already been in effect since 1994, and it is difficult to differentiate the impact of this regulation from other regulations in the fishery, and the impacts of other events (See Section 4.7.4.2, Cumulative Effects on the Socio-Economic Human Environment).

Therefore, a proper analysis of the social impacts of the preferred alternative, along with Alternatives 2, 3, 4 and 5 needs an accounting of snapper grouper fishing practices and associated cultural and community structures and processes before creation of the *Oculina* Experimental Closed Area, and then a comparison of those historical practices with the current situation in those same geographical areas. This accounting and analysis cannot be

performed (such as it is with the Economic Impacts), because, the historical data do not exist and attempting to reconstruct such data would involve carrying out a full ethno-historical assessment. Such a study is extremely capital, time and labor intensive and cannot practically be undertaken at this time due to budgetary limitations. Furthermore, it is uncertain how reliable much of the data would be, given that much would have to rely on reconstructing collective and individual memories of fishing activities more than 10 years ago.

Two trends can be identified in fishing activities, however, since the closure first occurred in 1994. The first is a steady decline in all types of commercial fishing activity and a steady decline in landings in the snapper grouper fishery. The second trend is an increase in the number of recreational anglers and number of trips and a leveling off in the amount of fish reported landed.

For both the recreational (charter, head boat, and private/rental sectors) and the commercial snapper grouper fishery, the negative impacts from any of the proposed alternatives that would continue the closure (the Preferred Alternative, and Alternatives 2, 3, 4, and 5) would be minimal. Negative impacts on the commercial snapper and grouper fishing sector have been experienced far more by increasing regulations limiting permits, imposing seasonal closures and size/trip limits. According to commercial fishermen interviewed in the past year, extending the closure of the *Oculina* Experimental Closed Area would not impose more hardship on them as they have already adapted their fishing practices to the closure. There are other issues that concern them, such as increasing imports and stagnant prices, more than a continuing closure of a section of the *Oculina* Bank.

Recreational fishermen have expressed – both in public hearing testimony and other commentary – more of a desire to open the *Oculina* Experimental Closed Area to snapper grouper fishing, or at least open sections of the area. There is great frustration among some recreational fishermen about the perceived low level of enforcement of the area’s boundaries. There is also confusion about how the *Oculina* Experimental Closed Area serves scientific research if such research is rarely – in their opinion - undertaken. For these reasons, the preferred alternative proposed by the Council is the alternative that best addresses these issues. Three years after the date of the final rule’s publication, the size and configuration of the *Oculina* Experimental Closed Area will be reviewed based on current and ongoing mapping studies of the area. Should the Council feel it wise to reconfigure the area, it can be done at that time. Regardless of that decision, the area itself will be re-evaluated both from a law enforcement and scientific perspective in 10 years. While enforcement of the boundaries of the *Oculina* Experimental Closed Area will be equal regardless of which alternative is chosen, none of the alternatives (alternatives 2, 3, 4 and 5) address the public concerns regarding scientific usefulness and size as well the preferred alternative. The different review components of the preferred alternative should inspire the public (fishing and non-fishing) to have more confidence in the Council’s actions, and directly translate not only into better compliance with the regulations, but also in approaching a sort of cooperative management process. Such “buy-in” by the public has been shown to be crucial for the success of other marine protected areas (National Marine Protected Areas Center 2003).

If, however, Alternative 6 (No action) were to be chosen, there would be some short-term benefits gained by probable increased catches and fishing satisfaction for all sectors. These benefits may be short-lived, however, as fish populations may be decreased significantly if heavy fishing pressure (both recreational and commercial) is exerted in the closed area. Fishing techniques for groupers such as “deep dropping” and the use of planers

would harm the brittle and fragile *Oculina varicosa* coral. As there is so little of this coral left undisturbed, it would be risky to allow a potentially deleterious gear to be used in the area. These two facts together would work to reduce the number of fish in the complex, creating more negative impacts through time. Lastly, though most likely slight, there is also a chance for increased competition and conflict between recreational and commercial snapper grouper fishermen as more fishermen try their luck in a relatively small section of ocean. As these tensions are already high in Florida, adding to this conflict would only exacerbate negative social impacts.

In comparing the impacts between each alternative for the commercial sector, the preferred alternative offers the least negative social impacts and in fact, offers more positive social returns as it follows the practice of adaptive management. Adaptive management has been variously defined, but here can be said to be “a policy framework that recognizes biological uncertainty, while accepting the congressional mandate to proceed on the basis of the ‘best available scientific knowledge’”. An adaptive policy treats the program as a set of experiments designed to test and extend the scientific basis of fish and wildlife management” (Lee and Lawrence 1986). By keeping the area closed but planning to review the configuration and size of the area within three years of publication of the final rule, recognizes that new data will be reviewed and if necessary, change in management actions may occur. Furthermore, the fact that the *Oculina* Experimental Closed Area will be re-evaluated in 10 years enhances the process of adaptive management.

4.2.4 Law Enforcement Impacts

One of the issues of most concern surrounding the *Oculina* Experimental Closed Area is the issue of enforcement. Observations made by Koenig (2001) showed that trawling activities continue to impact the entire *Oculina* HAPC. Testimony by the public at many Council meetings has also indicated that the public perceives a lack of enforcement of illegal trawling (and other illegal fishing) and a lack of knowledge of the regulations by the recreational fishing community. Lack of enforcement is one of the most common reasons cited by the public for not supporting continuation of the regulations within the *Oculina* Experimental Closed Area. The *Oculina* HAPC, including the Experimental Closed Area, is subject to enforcement patrols and investigations, despite logistical issues in enforcing the area. Documented violations in the *Oculina* HAPC from July 1993 through May 2003 include four trawling violations and one possession of rock shrimp. Documented violations during the same time period within the Experimental Closed Area included two cases of fishing for snapper grouper species and one possession of tilefish. One additional case was documented in a nearby area of possession of prohibited coral. Civil administrative enforcement action was taken against the violators in all nine cases.

In Amendment 5 to the Fishery Management Plan for the Shrimp Fishery of the South Atlantic Region (SAFMC 2002) the Council requires any vessel fishing with a limited access rock shrimp permit in the Council’s area of jurisdiction to use an approved vessel monitoring system. The request became effective October 14, 2003. The use of vessel monitoring systems will greatly increase the ability to enforce regulations within the *Oculina* HAPC and the *Oculina* Experimental Closed Area.

At their March 3-6, 2003 meeting the Council had an in-depth discussion about the issue of law enforcement in the Experimental Closed Area and made the following motion: (1) it is the Council’s position/policy that enforcement of the *Oculina* Closure is an utmost priority, (2) violation of the *Oculina* Experimental Closed Area is egregious and of a high

and aggravated nature, and (3) that we request NOAA GC revise the penalty schedule to be commensurate with the above classification. In response NOAA Fisheries has assigned a special agent to the area which should improve enforcement.

The preferred alternative allows continued protection of the fragile *Oculina* coral as well as the overfished deepwater snapper grouper species that aggregate to spawn and provides a sense of urgency to monitor the area in order to complete the required monitoring report. The longer an area is closed without monitoring it for effectiveness, the less public support it holds. In this time when enforcement resources are stretched thin, public support is important so that there is compliance with the regulations.

4.2.5 Conclusion

The Council chose Alternative 1 as the preferred alternative because it provides the most biological, social and economic benefits while allowing for adaptive management. By extending the prohibition on fishing for snapper grouper species in the closed area for an indefinite period of time the Council will continue to protect snapper grouper populations, protect *Oculina* coral and associated habitat functions, and provide a hedge against the high degree of scientific uncertainty associated with the status of snapper grouper species and to reduce the possibility that these populations may fall below sustainable levels. In addition, the preferred alternative will provide the highest level of protection to the *Oculina* coral in this area by prohibiting the use of all gears that may impact it. Economically it is expected that the long-term benefits, such as “insurance” against the uncertainty of stock assessments and the non-use benefits of extending the prohibitions on snapper grouper fishing in the closed area, outweigh the short-term benefits of opening the area to harvest. The preferred alternative is also expected to provide the most long-term positive social impacts because it allows for adaptive management which can be seen as an assurance to the public that this area will be monitored and reviewed. Should the Council find, after the 3 year review on size and configuration, that the boundaries of the area are not appropriate they can be changed at that time. In addition the public is assured that the area will not be closed and forgotten due to the 10-year re-evaluation period.

Moreover extending the closure for an indefinite period will help achieve the following objectives of the Snapper Grouper FMP: (1) prevent overfishing; (2) collect necessary data; (5) minimize habitat damage; (13) evaluate and minimize localized depletion; and (14) minimize bycatch. This action is supported by available scientific data indicating rebuilding of overfished stocks even under the less than optimal levels of monitoring and enforcement. Therefore, the Council concluded that the indefinite extension best supports the objectives cited, the available results from the first 10-year closure and other applicable law.

4.3 Research Needs

Research needs specific to the *Oculina* Experimental Closed Area are described in Section 3.1.2.4.4. In addition the RIR and SIA/FIS list additional research/data needs necessary to fully understand the economic and social impacts of this closure.

NOAA Fisheries will periodically review the *Oculina* Research Plan and modify the schedule to provide the remaining items. NMFS is to provide a revised *Oculina* Research Plan and an annual summary of available data and research results for the *Oculina* Experimental Closed Area as part of the Stock Assessment and Fishery Evaluation Report (SAFE) report. This Annual SAFE Report is to be written and provided to the South Atlantic Council at least three weeks prior to the Council’s annual December meeting.

4.4 Unavoidable Adverse Effects

This amendment would apply to the snapper grouper fishery prosecuted within the South Atlantic Council's area of jurisdiction. The preferred alternative would extend the *Oculina* Experimental Closed Area for an indefinite period. Except for forgone use benefits, there will be no short-term loss of economic benefits from continuation of the prohibition of harvest of snapper grouper species. Section 3.2.2 contains a detailed description of these forgone use benefits and the affected sectors. Refer to Section 4.2 for a detailed discussion of these impacts and 4.9 for the impact on small businesses.

4.5 Relationship of Short-Term Uses and Long-Term Productivity

The preferred alternative will continue the prohibition on fishing for and retention of snapper grouper species in the *Oculina* Experimental Closed Area. "As a result, participants in the snapper grouper fishery would be prohibited from re-entering the *Oculina* Experimental Closed Area in June 2004. The productivity of snapper grouper populations is expected to increase locally within the closed area over the long term as a result of this management action. The potential benefits associated with this increased productivity are expected to exceed any adverse social and economic impacts resulting from extending the snapper grouper prohibition.

4.6 Irreversible and Irretrievable Commitments of Resources

There are no irreversible or irretrievable commitment of resources.

4.7 Effects of the Fishery on the Environment

The biological impacts of the proposed action in are described in Section 4.2.1, including the impacts on habitat. No actions proposed in this amendment are anticipated to have any adverse impact on EFH or EFH-HAPCs for managed species including species in the snapper grouper complex. No additional impacts of fishing on EFH were identified during the public hearing process, therefore the Council has determined no new measures to address impacts on EFH are necessary at this time. **The Council's adopted habitat policies which may directly affect the area of concern, are included in Appendix B.**

NOTE: The Final EFH Rule, published on January 17, 2002, replaced the interim Final Rule of December 19, 1997 on which the original Essential Fish Habitat (EFH) and EFH Habitat Areas of Particular Concern (HAPC) designations were made. The Final Rule directs the Councils to periodically update EFH and HAPC information and designations within fishery management plans. As was done with the original Habitat Plan, a series of technical workshops are being conducted at this time by Council habitat staff to gather new information and review existing information as presented in the Habitat Plan to update information pursuant to the Final EFH Rule.

4.7.1 Damage to Ocean and Coastal Habitats

Alternatives 1-5 are not expected to have any adverse effect on the ocean and coastal habitat. They would benefit habitat by protecting fragile *Oculina* coral from potentially adverse impacts of fishing gear that is used to harvest snapper grouper species and that is not otherwise prohibited within the *Oculina* Experimental Closed Area.

Management measures adopted in the original management plan through Amendment 7 combined have significantly reduced the impact of the fishery on essential habitat. The Council has reduced the impact of the fishery and protected essential habitat by prohibiting the use of

poisons and explosives; prohibiting use of fish traps and entanglement nets in the EEZ; banning use of bottom trawls on live/hard bottom habitat north of Cape Canaveral, Florida; restricting use of bottom longlines to depths greater than 50 fathoms north of St. Lucie Inlet and only for species other than wreckfish; prohibiting use of bottom longlines south of St. Lucie Inlet; and prohibiting use of black sea bass pots south of Cape Canaveral, Florida. These gear restrictions have significantly reduced the impact of the fishery on coral and live/hard bottom habitat in the South Atlantic region.

Additional management measures in Amendment 8, including specifying allowable bait nets and capping effort, have protected habitat by making existing regulations more enforceable. Establishing a controlled effort program will limit overall fishing effort and to the extent there is damage to the habitat from the fishery (e.g., black sea bass pots, anchors from fishing vessels, impacts of weights used on fishing lines and bottom longlines), such impacts will be limited.

In addition, measures in Amendment 9, which include further restricting longlines to retention of only deepwater species and requiring that black sea bass pots have escape vents and escape panels with degradable fasteners, will reduce the catch of undersized fish and bycatch and ensure that the pot, if lost, will not continue to “ghost” fish. Also, limiting the overall fishing mortality will reduce the likelihood of overharvesting of species with the resulting loss in genetic diversity, ecosystem diversity, and sustainability.

Measures adopted in the Coral and Shrimp Fishery Management Plans have further restricted access by fishermen that had potential impacts on essential snapper grouper habitat. These measures include the designation of the *Oculina* Bank Habitat Area of Particular Concern and the Rock shrimp closed area (see the Shrimp and Coral FMP/Amendment documents for additional information).

The Council’s Comprehensive Habitat Amendment (SAFMC 1998b) contains measures that expanded the *Oculina* Bank HAPC and added two additional satellite HAPCs.

4.7.2 Public Health and Safety

The proposed actions, and their alternatives, are not expected to have any substantial adverse impact on public health or safety. The proposed measures do not increase hazards for vessels or crew safety because the proposed action extends regulations currently in place.

4.7.3 Endangered Species and Marine Mammals

Please refer to Appendix C: Biological Evaluation for information on the fishery’s interaction with endangered species and marine mammals.

4.7.4 Cumulative Effects

As directed by NEPA, federal agencies are mandated to assess not only the indirect and direct impacts, but the cumulative impacts as well. NEPA defines a cumulative impact as “*the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time*” (40 C.F.R. 1508.7). Cumulative effects can either be additive or synergistic. A synergistic effect is when the combined effects are greater than the sum of the individual effects.

The cumulative effects analysis requirement presents a challenge to the Council. In terms of the present state of information, cumulative effects analyses (CEA) are often too

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complex to permit a level of analysis equivalent to that performed for direct or indirect impacts. In the future, the cumulative effect requirement of NEPA will challenge the Council and NOAA Fisheries' ability to collect and analyze information.

Various approaches for assessing cumulative effects have been identified, including checklists, matrices, indices, and detailed models (MacDonald 2000). The Council on Environmental Quality (CEQ) offers guidance on conducting a cumulative effects analysis in a report titled "Considering Cumulative Effects under the National Environmental Policy Act". The report outlines 11 items for consideration in drafting a CEA for a proposed action.

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.
2. Establish the geographic scope of the analysis.
3. Establish the timeframe for the analysis.
4. Identify the other actions affecting the resources, ecosystems, and human communities of concern.
5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their relation to regulatory thresholds.
6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.
7. Define a baseline condition for the resources, ecosystems, and human communities.
8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.
9. Determine the magnitude and significance of cumulative effects.
10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.
11. Monitor the cumulative effects of the selected alternative and adapt management.

The CEA for the biophysical environment will follow these 11 steps. Cumulative effects on the biophysical environment and the socio-economic environment will be analyzed separately.

4.7.4.1 Cumulative Effects on the Biophysical Environment

SCOPING FOR CUMULATIVE EFFECTS

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.

The CEQ cumulative effects guidance states that this step is done through three activities. The three activities and the location in the document are as follows:

- I. The direct and indirect effects of the proposed actions (**Section 4.0**);
- II. Which resources, ecosystems, and human communities are affected (**Section 3.0**); and
- III. Which effects are important from a cumulative effects perspective (**issues discussion in Section 1.3.2 Key Issues and information revealed in this CEA**).

2. Establish the geographic scope of the analysis.

The immediate impact area is the *Oculina* Experimental Closed Area (the reader is to refer to Figure 4 of Section 1.0 for a map and coordinates). Since the boundaries are solely political in nature and do not prohibit immigration and emigration of fish, fish larvae, and coral planulae, the geographic scope of the CEA must be expanded. One method to determine the geographic scope is to consider the distance an effect can travel (CEQ 1997). For example, 20 drifters released from the *Oculina* Experimental Closed Area all moved northward; seven moved onto the continental shelf and 11 were transported north of Cape Hatteras via the Gulf Stream (Memo from J. Hare to P. Thompson 2003). There have been no studies conducted on juvenile and adult fish movement in the *Oculina* ecosystem.

In light of the available information, the extent of the boundaries would depend upon the degree of fish immigration/emigration and larval transport, whichever has the greatest geographical range. In terms of the deepwater *Oculina varicosa*, the boundaries should be set to include populations within the HAPC. The CEA cannot put geographical boundaries in terms of coordinates, but recognize that the proper geographical boundary to consider effects on the biophysical environment is larger than the *Oculina* Experimental Closed Area and not as large as the entire South Atlantic EEZ.

3. Establish the timeframe for the analysis.

Establishing a timeframe for the CEA is important for Step 4, when the past, present, and reasonably foreseeable future actions are discussed. Many feel that the CEA should go back to a time period when there was a natural, or some modified (but ecologically sustainable) condition. Submersible observations in the late 1970s provide an indication of a healthy *Oculina* population (Reed 1980). For precautionary reasons, it is wise to be conservative and go back to when data collection began in the early 1970s. In determining how far into the future to analyze cumulative effects, the length of the effects will depend on the alternative chosen. Most likely the effects will last past that date. It is not possible to bracket the timeframe with a future date with the alternatives that establish the closed area for an indefinite time period.

4. Identify the other actions affecting the resources, ecosystems, and human communities of concern (the cumulative effects to the human communities are discussed in Section 4.7.4.2).

Listed are other past, present, and reasonably foreseeable actions occurring in the geographic scope identified in Step 2. These actions, when added to the proposed extension of the *Oculina* Experimental Closed Area time period, may result in cumulative effects on the biophysical environment.

- I. SAFMC and fishery-related actions affecting *Oculina* and snapper groupers.
 - A. Past
The reader is to refer to **Section 1.5 History of Snapper Grouper Fishery Management in the South Atlantic** for past regulatory activity for the fish species. Inside the *Oculina* Experimental Closed Area, snapper and groupers are protected from fishing activities. Regulations have been put into place that protects these species outside the *Oculina* Experimental Closed Area. These include bag and size limits, spawning season closures (black grouper, gag, mutton snapper, greater amberjack, wreckfish and red porgy), trip limits,

commercial quotas, gear prohibitions and limitations and a commercial limited access system.

In terms of the coral, the reader is to refer to **Section 1.0 Background** for past regulatory activity. Past trawling has decimated many of the *Oculina* thickets (refer to Koenig et al. (2000) for a review). Restoration and habitat mapping/characterization efforts continue for the *Oculina* Banks (Koenig, 2001). In terms of restoration, corals were experimentally transplanted into the *Oculina* Banks between 1996-1999. In 2000, major efforts in coral transplantation were initiated with the deployment of 105 reefballs and 450 reef disks with attached *Oculina varicosa* fragments (Koenig 2001).

B. Present

The proposed action is to extend the protection to the *Oculina* Bank (snapper and grouper species and the *Oculina* coral) through prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area. In addition, Shrimp Amendment 5 has been approved and is awaiting implementation. One proposed action is to require vessel-monitoring systems (VMS) on all rock shrimp boats, which will prevent illegal trawling in the *Oculina* Experimental Closed Area by the rock shrimp fleet. In addition, during the SAFMC's March meeting, the Council approved a motion stating: (1) it is the Council's position/policy that enforcement of the *Oculina* Closure is an utmost priority, (2) violation of the *Oculina* Experimental Closed Area is egregious and of a high and aggravated nature, and (3) that we request NOAA GC revise the penalty schedule to commensurate with the above classification.

C. Reasonably Foreseeable Future

Snapper Grouper Amendments 13B and 14 are in development. Both amendments contain management measures targeted at maintaining catches in line with defined targets and thresholds. Amendment 14 proposes deepwater marine protected areas to protect snapper grouper spawning aggregations and preserve the natural age/size/genetic structure of unfished populations. In Florida, a marine protected area (permanent closure with some take allowed) is proposed by SAFMC nine nm southeast of the St. Lucie Inlet. This site includes an *Oculina* coral-based pinnacle system. It is a diverse mixture of habitats with north to south ledge systems and isolated *Oculina* studded pinnacles. It is also interspersed with flat hard bottom areas. The water depth at this site is 40-60 fathoms. The most abundant commercially and recreationally important species in this area is sea bass. It is the only area in this region where commercial quantities of sea bass occur. Snowy grouper are the second most important species. Vermilion snapper, red snapper, scamp, speckled hind, Warsaw grouper, gag grouper, and red porgy are present at this site. Also the "amberjack" group is well represented by greater amberjack, almaco jack, banded rudderfish, and a few small lesser amberjack (Ben Hartig, Chair, SAFMC King and Spanish Mackerel Advisory Panel, personal communication).

- II. Non-Council and other non-fishery related actions, including natural events affecting *Oculina* and snapper groupers
 - A. Past
 - B. Present
 - C. Reasonably foreseeable future

In terms of natural disturbances, Reed (1980) remarked that *Oculina varicosa* is too deep to be affected by wave action, but did indicate that the polychaete *Polydora* sp. and sipunculans are borers of the deep form of *O. varicosa*. Under more recent investigations, Koenig (2001) outlined five natural sources of potential damage to *O. varicosa*: extreme temperatures at depth, excessively high nutrient and sedimentation levels, high currents, pathogens, and freshwater seepage. To date, the existence/magnitude of the effects from these five factors have not been determined. In addition, it is assumed that any natural disturbance to the *O. varicosa* is of minor nature compared to the past anthropogenic damages from trawling (Koenig 2001).

Whether other non-Council actions negatively affect the fish populations within the geographic scope of the CEA is undeterminable at this time.

AFFECTED ENVIRONMENT

5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stresses concern (the cumulative effects to the human communities are discussed in Section 4.7.4.2).

In terms of the biophysical environment, the resources/ecosystems identified in earlier steps of the CEA are the *Oculina* coral in the HAPC and the fish populations within migration range of the *Oculina* Experimental Closed Area. This step should identify the trends, existing conditions, and the ability to withstand stresses of the environmental components.

The trend in the condition of the *Oculina* Banks can be seen through a comparison of Reed's (1980) and Koenig's (2001) state of the resource. Reed described healthy, intact coral thickets. More recent habitat surveys revealed "no new sites of live coral thickets and the status of known intact coral habitat was either similar or worse compared to past studies" (Koenig 2001). Such information correlates with the 1984 designation of the *Oculina* Bank as an HAPC in which mobile fishing gears such as trawls and dredges were prohibited in the area.

Oculina varicosa is fragile and recovers slowly from mechanical damage. Growth rates are apparently somewhat higher in deeper water than in shallow water (Dineen 2001). Growth for this species at 6 m depth is 11.3 mm per year; however, at 80 m depth, growth rate of *Oculina varicosa* is 16.1 mm per year (Dineen 2001).

Comparisons in fish populations between the 1980 and later studies reveal that fishing activity had a significant effect on community structure as evident by the severely altered population demographics (Koenig et al. 2000). With the diminution of grouper spawning aggregations and large fish in general, the scientists observed a shift from large, economically important fish to smaller, non-fishery species (Koenig et al. 2000). Scamp, gag, greater amberjack, and black sea bass, all economically important fish, accounted for 76% of the observed reef fish videotaped during submersible dives in 1980; by 1995, that number had decreased to 5% at the same reef location.

Studies have also reported on the depletion of grouper spawning aggregations. A scamp aggregation recorded by Gilmore and Jones (1992) was absent in 1995. In addition, two scamp aggregations on two separate reefs declined to a few individuals at each site during the same time period (Koenig et al. 2000).

Life history characteristics of snappers and groupers - relatively long-lived, slow growing, late maturing - leaves them susceptible to fishing pressure and slows the recovery of overfished populations (see Coleman et al. 2000 for a review). In general, the capacity of snappers grouper species to recover depends upon many factors, including age at maturity, generation time, environmental conditions, available habitat, harvesting pressure, age at removal, ability to reach mature age, and predation. Indications are that both the coral and fish populations had been decimated in the past in this area and the trend is towards recovery.

6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds concern (the cumulative effects to the human communities are discussed in Section 4.7.4.2).

This step is important in outlining the current and probable stress factors to the two major components identified in the previous steps (fish populations and *Oculina* coral). The goal is to determine whether these two components are approaching conditions where additional stresses will have an important cumulative effect beyond any current plan, regulatory, or sustainability threshold (CEQ 1997). Sustainability thresholds can be identified for some resources, which are levels of impact beyond which the resources cannot be sustained in a stable state. Other thresholds are established through numerical standards, qualitative standards, or management goals. The CEA should address whether thresholds could be exceeded because of the contribution of the proposed action to other cumulative activities affecting resources.

Fish populations

In the immediate impact zone, the *Oculina* Experimental Closed Area, the direct anthropogenic stress to the snapper and grouper populations is from illegal harvesting. There are no other known direct anthropogenic stresses. Within the wider geographic scope identified in Step 2, direct stresses may occur through fishing the perimeter of the *Oculina* Experimental Closed Area, although heavy fishing pressure in these areas has not been documented.

Qualitative thresholds for the snapper grouper fishery are established through snapper and grouper management goals as specified in the plans. Numeric overfishing and overfished thresholds are being modified in Amendment 13B for all snapper grouper species through development of fishing parameters on which a rebuilding plan is based. These include maximum sustainable yield (MSY), the fishing mortality rate that produces MSY (F_{msy}), the biomass or biomass proxy that supports MSY (B_{msy}), the minimum stock size threshold below which a stock is considered to be overfished (MSST), the maximum fishing mortality threshold above which a stock is considered to be undergoing overfishing (MFMT), and optimum yield (OY). Once the numeric benchmarks are determined, the snapper and grouper stocks will have biomass-based targets and thresholds.

Corals

The current stresses from trawling have been eliminated in the HAPC and *Oculina* Experimental Closed Area through the prohibition of destructive fishing gear (bottom

longline, trawl, dredge, pot, or trap) and anchoring by fishing vessels. The only current direct anthropogenic stresses to the *Oculina* populations is from illegal trawling for rock shrimp (and other species such as royal red shrimp and calico scallops) and illegal fishing for snapper grouper species in the area. Implementation of VMS on all rock shrimp vessels should eliminate illegal harvesting. In addition, restoration efforts are underway to speed the natural recovery process by introducing *Oculina* fragments into the *Oculina* Bank (the fragments and reefballs are also expected to provide habitat for fish present in this area). Other natural and anthropogenic stresses to the deepwater corals besides illegal fishing are of a speculative nature.

The population of *Oculina* appears to be at or below a threshold of sustainability due to the significant reduction in the population size from historical levels (Koenig 2001).

7. Define a baseline condition for the resources, ecosystems, and human communities concern (the cumulative effects to the human communities are discussed in Section 4.7.4.2).

The purpose of defining a baseline condition for the resource and ecosystems in the area of the proposed action is to establish a point of reference for evaluating the extent and significance of expected cumulative effects. Observations through submersible dives and dredge/trawl records drawn from the early scientific literature serve to construct a baseline condition for the *Oculina* coral and fish populations (Reed 1980, 1992; Gilmore and Jones 1992). Observations describe a sustainable ecosystem with healthy *Oculina* thickets and fish populations. *Oculina* thickets as described by Reed (1980) indicated white and pink colonies with irregular, dendritic branches that average 6 mm in diameter. It appears that the thickets were once extensive in the area as only 15 out of 135 submersible surveys occurring between 1975 and 1979 were over hard bottom areas where *Oculina* was not observed (Reed 1980). The coral was observed 2-6 km paralleling the 80° meridian.

A baseline fish community can be interpreted from videotapes from 1980 submersible dives at Jeff's Reef. The footage showed "a diverse assemblage of economically important species of the grouper-snapper complex" (Koenig et al. 2000). Scamp and greater amberjack dominated the census with a 35.7% and 30.1% composition respectively. Gilmore and Jones (1992) observed gag spawning aggregations in 1980.

DETERMINING THE ENVIRONMENTAL CONSEQUENCES OF CUMULATIVE EFFECTS

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.

The relationship between human activities and biophysical ecosystems within the context of this CEA is solely related to extractive activities and the installment of regulations as outlined in Table 26.

Table 26. The cause and effect relationship of fishing and regulatory actions within the time period of the CEA and the *Oculina* Experimental Closed Area. A plus or minus designates whether the action(s) represent a beneficial or adverse impact to the biophysical environment.

Time period/dates	Cause	Observed and/or Expected Effects
1960s-1984	Trawling for calico scallop, rock and royal red shrimp, and snapper grouper permitted/occurred in the EEZ (SAFMC 1998c)	Reported decimation of many <i>Oculina</i> thickets (-)
1984	HAPC established with gear restrictions	Initiated the protection of the <i>Oculina</i> habitat (+)
pre-June 27, 1994	High fishing intensity (SAFMC 1998a, 1998d)	Noticeable decrease in numbers and species diversity (-)
June 1994	Prohibition of fishing for and retention of snapper grouper species (HAPC renamed OECA)	Initiated the recovery of snapper grouper species (+)
1996	Establishment of rock shrimp closed area	Expand protection of coral habitat (+)
1998	HAPC expanded to include rock shrimp closed area	Continue protection of coral habitat (+)
1999-current	Placement of reef balls and transplanted <i>Oculina</i> fragments	Increase the rate of natural recovery of fish and coral populations (+)
In development	Snapper Grouper FMP Amendment 13B	Restoration of overfished populations (+)
In development	Snapper Grouper FMP Amendment 14 (MPAs)	Protection of snapper grouper species and certain deepwater spawning sites (+)

9. Determine the magnitude and significance of cumulative effects.

By prohibiting fishing for and retention of snapper grouper species in the *Oculina* Experimental Closed Area, the proposed action will have a beneficial, cumulative effect on the biophysical environment in addition to other past, present, and foreseeable actions (i.e., placement of concrete structures to the seabed, restoration of *Oculina* coral, elimination of trawling activities, measures to rebuild overfished populations). It is expected that the relationship between the effects will be synergistic. The magnitude of the cumulative effect is undeterminable at this time due to data limitations.

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.

The cumulative effects on the biophysical environment are positive. Avoidance, minimization, and mitigation are not applicable.

11. Monitor the cumulative effects of the selected alternative and modify management as necessary.

The effects of the proposed action are, and will continue to be, monitored through scientific experiments and observations. The current and future work in the *Oculina* Experimental Closed Area is summarized in Section 3.1.2.4.4 and Section 4.3 in this document.

4.7.4.2 Cumulative Effects on the Socio-Economic/Human Environment
Cumulative Economic Effects

At the time the *Oculina* area was designated as a HAPC, under the Council's Coral Fishery Management Plan, there was a substantial recreational and commercial fishery for groupers, snappers and tilefishes (GMFMC and SAFMC 1982). In order to protect *Oculina* coral and associated habitat functions, the use of all bottom trawls, bottom longlines, dredges, and fish traps and pots were prohibited within the HAPC. There was loss of revenue to commercial fishermen who were dependent on snapper grouper and other bottom dwelling species. The ex-vessel value of these losses was not documented at that time due to data limitations. In 1994, Amendment 6 to the Snapper Grouper Fishery Management Plan (SAFMC 1993) prohibited anchoring by fishing vessels and fishing for snapper grouper species in the *Oculina* Experimental Closed Area. From public hearing testimony this action affected commercial hook and line fishermen, the recreational for-hire sector and the private recreational sector. These impacts were not documented due to data limitations but there was some protest from a few fishermen in the north/central Florida area who stated that this measure would significantly reduce their available fishing area.

Additional restrictions implemented in subsequent amendments to the Snapper grouper Fishery Management Plan resulted in further reductions in revenue and non-market benefits to harvesters of the resource. Implementation of the limited access program reduced the number of commercial fishermen in the snapper grouper fishery (SAFMC 1997). Commercial and recreational fishermen in the snapper grouper fishery have faced additional restrictions and thus reduced net revenue and net consumer surplus benefits from measures implemented in Amendment 9 (SAFMC 1998a) and Amendment 12 (SAFMC 2000) to the snapper grouper fishery management plan. In addition to these effects, these fishermen participate in other fisheries where regulations have resulted in increased loss of annual net benefits (e.g., shark and highly migratory species). Commercial fishermen have faced increased competition from imports and other exogenous factors such as coastal development and loss of traditional markets. Furthermore, the increased cost of fuel

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and dock space for vessels and fish houses have resulted in reduced profit margins for these fishermen.

The restrictive measures in the snapper grouper fishery referred to in the preceding discussion were adopted to rebuild overfished species in the snapper grouper complex. On the one hand these regulations reduced the net revenue and net consumer surplus benefits to fishermen, however they were necessary to improve the health of these depleted resources, which in turn will result in increased future economic benefits to both harvesters (recreational and commercial) and non-consumptive users. Also, as populations increase it is expected that the non-use value (existence value) to society would increase. In the long-term when stocks rebuild and regulations become less restrictive, the fishing sector would realize gains in overall net revenue and net consumer surplus benefits (from recreational fishing). However, the same individuals who experienced these negative short run impacts may not benefit from these improvements, unless they participate in the fishery when regulations become less restrictive and the quality of fishing improves. Similarly, recreational anglers who experience losses of net consumer surplus benefits due to reductions in bag limits, seasonal closures, increased minimum size regulations, and other measures may not benefit from more liberal regulations in the future when these stocks increase.

Refer to Section 4.2 for a detailed discussion of the incremental economic effect of the proposed measure to extend the Experimental Closed Area and the alternatives considered. In summary, the proposed action will protect the snapper grouper resources and the *Oculina* coral and associated habitat functions in this area. The shelf edge system is considered to be a unique ecosystem. Dense and diverse populations of fishes and invertebrates are associated with these coral formations. Improvements and protection of these resources would continue and increase economic use and non-use benefits to society. However, there is a cost (forgone use value) to keeping this area closed. The magnitude of this cost will depend on the demand to fish in this area and the quality of fishing outside of the area.

Cumulative Social Effects

The extension of the closure of the *Oculina* Experimental Closed Area is in itself a “small” management measure that affects a small portion of the recreational and commercial snapper grouper fishermen in the South Atlantic. There are larger impacts on law enforcement personnel who must now devote more time to this area. Such demands come in the aftermath of the attacks of September 11, 2001 which has stretched enforcement agencies time requirements, manpower, and budget constraints. There have also been positive benefits for members of conservation-oriented social groupings, in that the closure of the *Oculina* Bank has been a measure that conserves snapper grouper species. However, while a relatively small action, it will potentially impact the recreational and commercial sectors of the fishery in a greater way because the action must be considered in concert with other events that together combine to have a larger effect on the human populations of the area.

Since the mid-1900s, this area of Florida, encompassing Brevard, Indian River, and St. Lucie counties, has been subjected to a large amount of real estate development, both commercial and residential. Creation of the NASA Space Center at Cape Canaveral, opening of the port at the same location, and establishment of the Cape Canaveral National Seashore have changed the lifestyles of all the communities in the area along with the commercial and recreational sectors of the populations. Later, creation of Walt Disney World in Orlando, along with other resorts in the area, has both drawn young people from the coast and spurred further development of the port as cruise ships frequently dock to service the Orlando/Central

Florida region. Population growth for the three affected counties since the 1990 Census has been in the double digit range: Brevard, 17.9%, Indian River, 11.1% and St. Lucie, 21.1%.

It would appear that the most negative impacts have been upon the commercial fishing sector that exploits snapper grouper species. While the number of recreational fishermen has dramatically increased in Florida, the number of commercial fishermen has declined. The reasons for this decline are numerous. One reason often cited by commercial fishermen is implementation of the net ban in 1995 which prohibited use of gillnets in the state waters of Florida.

According to Kevin Judah, of Sebastian, Florida, and part-owner of Judah and Son fish house (established in 1949), there used to be about 30 fishermen who would tie their boats at his dock before the ban (Kevin Judah, Personal Communication, 2003). They fished for spot, croaker, whiting and pompano, along with some snapper and grouper. Today, in 2003, not one boat docks at the fish house, and when the elder Judah retires, the business will probably be sold. Along with the loss of landings due to the ban, another impact has been the increasing amount of taxes to be paid on dock facilities in Florida. Unlike the States of South Carolina and Georgia, there is no tax relief for commercial fishing operations in Florida. The effect of the net ban may not have had a direct impact on the snapper grouper commercial boats in the area, but when fish houses become less profitable and are forced to close, all commercial boats will experience the loss of marketing opportunities.

According to a commercial snapper grouper fisherman from Ft. Pierce, Florida, the closure of the *Oculina* Experimental Closed Area did not impact him directly, but rather created problems of increased competition for certain species when the deepwater fishing boats that worked the *Oculina* Bank moved inshore to shallower waters. He claims that the closure increased competition in a spatial sense, with more fishermen fishing in a smaller area. Crowding has also increased due to the sheer growth in the number of recreational boats in Florida waters.

Another factor to consider is the impact of the limited entry system on the South Atlantic snapper grouper fleet as whole. There is uncertainty as to how many vessels or fishermen are actively participating in the fishery currently, and a study of the fishery's capacity needs to be undertaken in the near future. With the current 2-for-1 permit system, and the price of permits averaging approximately \$10,000, it is difficult for younger fishermen to enter the fishery for the first time.

Other impacts to the area's fishermen – commercial and recreational – and the associated businesses such as bait and tackle stores or fish houses – from events such a slow economic environment, rising fuel costs, and the decrease in tourism due to the events of September 11, 2001, should be considered but cannot be quantified at this time. See the SIA/FIS at the beginning of this document for further discussion of these limitations.

4.7.4.3 Information Needed for a More Thorough and Complete CEA

Data and research needs are described in the Social Impact Assessment, Section 3.1.2.4.4 and Section 4.3.

4.7.4.4 Current SAFMC Projects to Gain a Better Understanding of Cumulative Effects

Recognizing that information to conduct a cumulative impact analysis is lacking, the Council has initiated programs to gather information on the cumulative impacts to fishermen. One such program will have staff meeting with commercial, recreational, and for-hire vessel owners/operators/crew. The objective will be to document the cumulative impacts on the human environment of the Council's various plans/amendments and associated regulatory requirements (reporting requirements, permit application process, notices of openings/closings and other regulatory changes, and quality of data collection). Armed with this information, the Council will be closer to meeting its goal of gathering cumulative impact information, documenting and incorporating the information into management decisions, and then avoiding, minimizing and/or mitigating the cumulative impacts to fishermen when applicable.

In addition, the Council is developing a programmatic evaluation of the fishery ecosystem through a Fishery Ecosystem Plan (FEP) for the South Atlantic fisheries. Specific elements of a FEP include delineation of ecosystem boundaries, food web modeling, ecosystem-level effects of fishing, increased socio-economic information, and calculation of total fishery removals. The FEP will serve as a natural extension of the Council's Habitat Plan (SAFMC 1998c) and Comprehensive Environmental Impact Statement (SAFMC 1998b), which functionally consolidated information on habitat essential to species managed in the South Atlantic Bight. Identification of cumulative impacts of management actions will greatly improve through the identification of ecosystem-level interactions and processes within the fishery (i.e., predator-prey interactions, ecosystem effects of fishing on various trophic levels, and human community interactions with changes in fishing regulations).

4.8 Public and Private Costs

Preparation, implementation, enforcement, and monitoring of this and any federal action involves expenditure of public and private resources which can be expressed as costs associated with the regulation (Table 27). Costs associated with Amendment 13A include:

Table 27. Public and private costs.

Council costs of document preparation, meetings, scoping meetings, public hearings and information dissemination	\$40,000
NMFS administrative costs of document preparation, meetings and review	\$20,000
NMFS law enforcement costs	?
Total	\$60,000

4.9 Effects on Small Businesses: Initial Regulatory Flexibility Analysis (IRFA)

Introduction: The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration. The RFA does not contain any decision criteria; instead, the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the FMP or amendment (including framework management measures and other regulatory actions) and to ensure that the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct a regulatory flexibility analysis for each proposed rule. The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. In addition to analyses conducted for the RIR, the regulatory flexibility analysis provides: (1) a description of the reasons why action by the agency is being considered; (2) a succinct statement of the objectives of, and legal basis for the proposed rule; (3) an identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule; (4) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; (5) a description of the projected reporting, record-keeping, and other compliance requirements of the final rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; (6) a description of significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities.

Statement of need for, objectives of, and legal basis for the rule: The purpose and need, issues, problems and objectives of the proposed FMP's Section 1.2 are incorporated here by reference. In summary, the proposed action is for the purpose of producing a hedge against the uncertainty inherent in stock assessments and to provide the highest protection in the *Oculina* coral habitat in the closed area. The Magnuson-Stevens Act, as amended, provides the statutory basis for the proposed rule.

Identification of all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule: No duplicative, overlapping, or conflicting Federal rules have been identified.

Description and estimate of the number of small entities to which the proposed rule will apply: There are two general classes of small business entities that would be directly affected by the proposed rule, commercial fishing vessels and for-hire fishing vessels. The Small Business Administration defines a small business that engages in the charter fishing as a firm that is independently owned and operated, is not dominant in its field of operation, and has annual receipts

4.0 Environmental Consequences

up to \$6.0 million per year. The revenue benchmark for a small business that engages in commercial fishing is a firm with receipts up to \$3.5 million.

There were 1,174 commercial snapper grouper permitted vessels in the South Atlantic during 2002 (Table 11a). Of these permitted vessels, 120 (Table 11c) were home ported in the “area of interest.” Based on previous economic studies on the snapper grouper fishery operating in the South Atlantic (Waters et al. 2000), it is assumed that all entities will qualify as small business entities because their gross revenues are less than \$3.5 million per vessel annually.

For the charter sector 1,221 snapper grouper for-hire permits were issued to vessels in the southern Atlantic states in 2002 (Table 9a). Of this total, 94 permits were issued to for-hire vessels in the “area of interest”(Table 9d). Charterboats that operate in the South Atlantic are all expected to be small entities since their individual gross receipts will be less than \$6.0 million (Holland et al. 1999).

Description of the projected reporting, record-keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records: The proposed rule does not impose any reporting or record keeping requirements.

Substantial number of small entities criterion: The number of commercial and for-hire vessels that would fish in the closed area should the area reopen after the current rule sunsets is not known. Thus, it cannot be determined whether a substantial number of the population will be affected by the proposed rule.

Significant economic impact criterion: The outcome of “significant economic impact” can be ascertained by examining two issues: disproportionality and profitability.

Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?

All the vessel operations affected by the proposed FMP are considered small entities so the issue of disproportionality does not arise in the present case.

Profitability: Do the regulations significantly reduce profit for a substantial number of small entities?

The impact on the current profitability of vessels in the commercial hook-and-line fishery that are likely to be affected by this measure is unknown. In 1997, Waters et al. (2000) estimated that vessels in the southern area of Florida earned an average of \$16,633 (revenue net of routine trip costs expressed in 2001 dollars) from harvesting mid-shelf snapper grouper species. This does not represent the vessel’s overall annual profitability since vessels in this fishery earn additional revenue from other fisheries. Furthermore, this estimate represents profitability of the mid-shelf trips during 1997, which may be different in 2002 due to fishery regulations and other changes in the economic environment after 1997. After making a number of assumptions, a more recent estimate of vessel profitability is contained in Table 25c. The calculated current net revenue per vessel from snapper grouper fishing in the “area of interest” amounts to \$9,952 (\$1,015,117/120). Again, this does not

represent the total annual net cash flow for the average commercial vessel since there is additional net revenue from the harvesting of other fish species. Also, some of these vessels earn additional revenue from charters for recreational fishing at certain times of the year.

In the charter fishing sector, the average gross revenue per vessel (Table 25a) was \$57,120 (adjusted for inflation to 2001 dollars) for the Atlantic coast of Florida (Holland et al. 1999). The average annual expenditure per vessel in Florida for fuel and oil, bait, food and drink, ice and wages and salaries in 1997 was \$41,878 (in 2001 dollars). Average profitability for these vessels in 1997 expressed in 2001 dollars is \$15,242. Some charter vessels also operate in the commercial harvesting sector and obtain revenue from the sale of commercially harvested species. Thus, the average net annual cash flow for these vessels is higher than this value.

It must be emphasized that this action will not lower current profitability. By continuing this prohibition, these business entities will not be allowed the opportunity for potentially increasing revenue from fishing in the closed area. It is not possible to estimate this change in net profits with any certainty because the actual fishing effort that would be directed at snapper grouper species in the closed area is unknown. Also, even if these estimates were available, the incremental change in net vessel profits would depend on whether overall vessel effort increased or whether there was simply a displacement of effort from outside of the area into the closed area. Apart from overall change in effort, travel cost to the closed area and comparative quality of fishing would also determine vessel profitability.

It is unknown whether this action could result in a significant impact on a substantial number of small entities. As a result of this inability to certify, an IRFA is prepared.

Description of significant alternatives: Section 4.2 of this document contains a description of the alternatives proposed for this measure. The economic impacts are described for these alternatives. Apart from the no action alternative, the other alternatives proposed different lengths of time for maintaining the prohibition on snapper grouper fishing. Therefore, they are expected to have the same effect on short-term profitability as the preferred alternative. The “no action” alternative would allow for a potential increase in short-term profitability. However, if snapper grouper populations become depleted inside the closed area, any short-term gains will not be sustained in the future. There is also the risk that the no action alternative (Alternative 6) would result in a reduction of other economic benefits to society. A supplemental economic analysis is contained in Appendix E. Refer to Section 4.2 for a more in depth discussion of the non-use and indirect use benefits from the closed area. Additional alternatives are included Appendix A.

5.0 LIST OF PREPARERS

Amendment 13A to the Snapper Grouper FMP is the first South Atlantic Council document to be prepared under the “front loading” process. The following individuals served on the Amendment 13A Team and contributed to the preparation of this document:

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List of Agencies, Organizations, and Persons Consulted

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 SAFMC Snapper Grouper Advisory Panel
 SAFMC Marine Protected Areas Advisory Panel
 SAFMC Coral Advisory Panel
 SAFMC Habitat and Environmental Protection Panel
 SAFMC Scientific and Statistical Committee
 North Carolina Coastal Zone Management Program
 South Carolina Coastal Zone Management Program
 Georgia Coastal Zone Management Program
 Florida Coastal Zone Management Program
 Florida Department of Environmental Protection
 Florida Marine Fisheries Commission
 Georgia Department of Natural Resources
 South Carolina Department of Natural Resources
 North Carolina Department of Environment, Health, and Natural Resources
 Florida Sea Grant
 Atlantic States Marine Fisheries Commission
 Gulf and South Atlantic Fisheries Development Foundation
 Gulf of Mexico Fishery Management Council
 National Marine Fisheries Service
 - Washington Office
 - Office of Ecology and Conservation
 - Southeast Regional Office
 - Southeast Fisheries Science Center
 National Oceanic and Atmospheric Administration
 - General Counsel
 United States Coast Guard
 United States Environmental Protection Agency, Region IV
 Monroe County Commercial Fishermen, Inc.
 New River Fisherman's Association
 North Carolina Fisheries Association, Inc.
 National Fisheries Institute
 Ocean Conservancy
 Atlantic Coast Conservation Association
 Environmental Defense
 Project Reefkeeper

7.0 OTHER APPLICABLE LAW

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 U.S.C. 1801 et seq.) governs the conservation and management of ocean fishing in the United States. The purpose of the MSFCMA is to create sustainable fisheries in United States waters through the elimination of overfishing and rebuilding of overfished stocks important to commercial, recreational, and subsistence fisheries. In addition to the MSFCMA, the Council and NOAA Fisheries must comply with many applicable laws during the production of Fishery Management Plans (FMPs) and FMP amendments. Major laws affecting Federal fishery management decision making in the South Atlantic are summarized below.

7.1 Administrative Procedures Act

All federal rulemaking is governed under the provisions of the Administrative Procedure Act (APA) (5 U.S.C. Subchapter II), which establishes a “notice and comment” procedure to enable public participation in the rulemaking process. Under the APA, NOAA Fisheries is required to publish notification of proposed rules in the *Federal Register* and to solicit, consider and respond to public comment on those rules before they are finalized. The APA also establishes a 30-day wait period from the time a final rule is published until it takes effect.

7.2 Coastal Zone Management Act

Section 307(c)(1) of the federal Coastal Zone Management Act (CZMA) of 1972 requires that all federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. While it is the goal of the South Atlantic Council to have management measures that complement those of the states, Federal and state administrative procedures vary and regulatory changes are unlikely to be fully instituted at the same time. Based on the analysis of the environmental consequences of the proposed action in Section 4.0, the Council has concluded this amendment would improve Federal management of snapper grouper species.

This amendment is consistent with the Coastal Zone Management Plans of Florida, South Carolina, Georgia, and North Carolina to the maximum extent practicable. This determination was submitted to the responsible state agencies under Section 307 of the CZMA administering approved Coastal Zone Management Programs in the States of Florida, South Carolina, Georgia and North Carolina.

7.3 Endangered Species Act

Section 7(a)(1) of the Endangered Species Act (ESA) of 1973, as amended, requires all Federal agencies to participate in the conservation and recovery of listed threatened and endangered species. Section 7(a)(2) states that federal agencies must ensure that any activity they authorize, fund or carry out is not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of designated critical habitat. To facilitate compliance with Section 7(a)(2), a biological assessment or evaluation is prepared by the action agency (in the case of fishery management plans, NOAA Fisheries’ Office of Sustainable Fisheries is the action agency, although the Council prepares the biological evaluation) to evaluate the likely effects of the proposed fishery action(s) on endangered and threatened species and designated critical habitat(s) occurring within the area of the proposed

action(s) [Section 7(c)]. The biological evaluation aids NOAA Fisheries' Division of Protected Resources (the consulting agency) in determining what further action (informal/formal consultation) is required. Consultations are concluded informally when proposed actions "may affect but are not likely to adversely affect" endangered or threatened species or designated critical habitat. Formal consultations, including a biological opinion, are required when proposed actions may affect and are "likely to adversely affect" endangered or threatened species or designated critical habitat. If jeopardy or adverse modification is found, the consulting agency is required to suggest reasonable and prudent alternatives.

The reader is referred to the Biological Evaluation in Appendix C for a detailed listing of the protected species known to occur in the action area as well as for a detailed assessment of possible impacts to these species. The Office of Sustainable Fisheries will request the SERO's Division of Protected Resources conduct a consultation under Section 7 of the ESA on the impacts of the actions in this amendment.

7.4 Executive Order 12612: Federalism

E.O. 12612 requires agencies to be guided by the fundamental federalism principles when formulating and implementing policies that have federalism implications. The purpose of the Order is to guarantee the division of governmental responsibilities between the Federal government and the States, as intended by the framers of the Constitution. No federalism issues have been identified relative to the actions proposed in this amendment and associated regulations. The affected states have been closely involved in developing the proposed management measures and the principal state officials responsible for fisheries management in their respective states have not expressed federalism related opposition to the proposed action.

7.5 Executive Order 12866: Regulatory Planning and Review

E.O. 12866, signed in 1993, requires federal agencies to assess the costs and benefits of their proposed regulations, including distributional impacts, and to select alternatives that maximize net benefits to society. To comply with E.O. 12866, NOAA Fisheries prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that implement a new FMP or that significantly amend an existing plan. RIRs provide a comprehensive analysis of the costs and benefits to society associated with proposed regulatory actions, the problems and policy objectives prompting the regulatory proposals, and the major alternatives that could be used to solve the problems. The reviews also serve as the basis for the agency's determinations as to whether proposed regulations are a "significant regulatory action" under the criteria provided in E.O. 12866 and whether proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the RFA. A regulation is significant if it is likely to result in an annual effect on the economy of at least \$100,000,000 or if it has other major economic effects.

7.6 Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations

E.O. 12898 requires that Federal agencies conduct their programs, policies and activities in a manner to ensure that individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination because of their race, color, or national origin. In addition, and specifically with respect to subsistence

consumption of fish and wildlife, Federal agencies are required to collect, maintain and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence.

7.7 Executive Order 12962: Recreational Fisheries

E.O. 12962 requires Federal agencies, in cooperation with States and Tribes, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities through a variety of methods including, but not limited to, developing joint partnerships; promoting the restoration of recreational fishing areas that are limited by water quality and habitat degradation; fostering sound aquatic conservation and restoration endeavors; and evaluating the effects of Federally-funded, permitted, or authorized actions on aquatic systems and evaluating the effects of Federally-funded, permitted, or authorized actions on aquatic systems and recreational fisheries, and documenting those effects. Additionally, the order establishes a seven member National Recreational Fisheries Coordination Council responsible for, among other things, ensuring that social and economic values of healthy aquatic systems that support recreational fisheries are considered by Federal agencies in the course of their actions, sharing the latest resource information and management technologies, and reducing duplicative and cost-inefficient programs among Federal agencies involved in conserving or managing recreational fisheries. The Council also is responsible for developing, in cooperation with Federal agencies, States and Tribes, a Recreational Fishery Resource Conservation Plan - to include a five-year agenda. Finally, the Order requires NOAA Fisheries and the U.S. Fish and Wildlife Service to develop a joint agency policy for administering the ESA.

7.8 Executive Order 13089: Coral Reef Protection

E.O. 13089, signed by President William Clinton on June 11, 1998, recognizes the ecological, social, and economic values provided by the Nation's coral reefs and ensures that Federal agencies are protecting these ecosystems. More specifically, the Order requires Federal agencies to identify actions that may harm U.S. coral reef ecosystems, to utilize their program and authorities to protect and enhance the conditions of such ecosystems, and to ensure that their actions do not degrade the condition of the coral reef ecosystem.

Amendment 13A to the Snapper Grouper FMP, which would eliminate all potential adverse impacts to *Oculina* coral in the *Oculina* Experimental Closed Area that are associated with bottom fishing gear, fulfills the intentions of E.O. 13089. As noted in Section 1.1, the use of bottom trawls, bottom longlines, dredges, fish traps, and fish pots is currently prohibited within the *Oculina* Experimental Closed Area and that prohibition would not be affected by the proposed action. The proposed action would prohibit within the *Oculina* Experimental Closed Area the use of any other fishing gear used to harvest snapper grouper species.

7.9 Executive Order 13158: Marine Protected Areas

E. O. 13158 was signed on May 26, 2000 to strengthen the protection of U.S. ocean and coastal resources through the use of Marine Protected Areas (MPAs). The E.O. defined MPAs as "any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein". It directs federal agencies to work closely with state,

local and non-governmental partners to create a comprehensive network of MPAs “representing diverse U.S. marine ecosystems, and the Nation’s natural and cultural resources”.

7.10 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 et seq.), originally enacted in 1972, established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas as well as on the importation of marine mammals and marine mammal products into the United States. The term “take” is statutorily defined to mean “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal”. Jurisdiction over marine mammals is divided between the U.S. Fish and Wildlife Service and NOAA Fisheries. The former manages sea otters, polar bears, manatees, dugongs and walrus, while the latter manages whales, dolphins, porpoises, seals and sea lions. The primary goals of the two agencies are to ensure that marine mammal stocks are maintained at, or in some cases restored to, their optimum sustainable population (OSP) level within the carrying capacity of the habitat and to maintain the health and stability of the marine ecosystem.

The 1994 reauthorization of the MMPA introduced substantial changes to the provisions of the MMPA of 1972. One of the more notable changes involved the development of a long-term strategy for governing interactions between marine mammals and commercial fishing operations (Sections 117 and 118). Section 118 established the immediate goal of reducing the incidental mortality or serious injury of marine mammals occurring in the course of commercial fishing operations to below the Potential Biological Removal (PBR) level and a long-term goal of reducing significant injury and mortality of marine mammals in commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate goal (ZMRG).

To aid in achieving these goals, the MMPA Amendments of 1994 mandated the preparation of marine mammal stock assessment reports, a registration and incidental take monitoring program for certain commercial fisheries, a marine mammal incidental injury and mortality self-reporting requirement for all fisheries, and the development and implementation of take reduction plans. In addition, NOAA Fisheries instituted a mechanism for issuing permits to incidentally take endangered and threatened marine mammals provided that, together with other restrictions, incidental mortality and serious injury from commercial fisheries will have a negligible impact on the stock and that a recovery plan has been or is being developed for the species [Section 101(a)(5)(E)].

Under the registration and incidental take monitoring program, NOAA Fisheries created a three tier classification for commercial fisheries based primarily on the level of serious injury and mortality of marine mammals that occur incidental to that fishery. Category I includes commercial fisheries determined to have frequent incidental mortality and serious injury of marine mammals, Category II includes commercial fisheries determined to have occasional incidental mortality and serious injury of marine mammals, and Category III includes commercial fisheries determined to have a remote likelihood of or no known incidental mortality and serious injury of marine mammals.

Other factors are also considered when determining the category for a fishery including the type of gear used in the fishery, fishing techniques employed and areas and seasons fished in relation to the distribution and seasonal occurrence of marine mammals within fished areas. Category I and II fisheries are required to register with the Marine

Mammal Authorization Program (MMAP) and must comply with take reduction plans and additional MMAP requirements such as carrying an on-board observer when requested. Currently, under the 2003 proposed List of Fisheries (LOF), the southeast Atlantic snapper grouper hook-and-line fishery is considered to be a Category III fishery (68 FR 1414).

An over-arching objective of the MMPA, as amended, is to meet the above listed goals while taking into account the economics of the fishery and the availability of existing technology and management strategies already in place under state and/or regional FMPs.

7.11 Migratory Bird Treaty Act and Executive Order 13186

Seabirds are frequent companions to commercial marine fishing vessels as they will feed on fish that escape trawl nets, seines and other fishing gear. They also are known to target baited hooks of hook-and-line fishing gear. In the process of feeding, seabirds can become entangled or hooked on gear and be incidentally killed. The probability of incidental catches of seabirds is a function of many interrelated factors including: the type of fishing operation and gear used, the length of time that fishing gear is at or near the surface of the water, the behavior of the bird (specific feeding/foraging techniques), water and weather conditions, and the time of year and location in which the fishery takes place. The occurrence and density of seabirds in an area can vary greatly depending on breeding activity, migration patterns and foraging needs.

Seabirds, and other migratory birds, are protected under the Migratory Bird Treaty Act (MBTA) of 1918. The MBTA prohibits taking any migratory bird except as permitted by regulations issued by the Department of the Interior. However, conservation law to protect seabirds with regard to fisheries has been lacking until recently. To address on-going concerns with seabird and fisheries interactions, NOAA Fisheries recently initiated an Interagency Seabird Working Group (ISWG). The group includes representatives from NOAA Fisheries, the U.S. Fish and Wildlife Service, regional Councils and coastal states. This new initiative looks to find practicable and effective solutions for reducing or eliminating seabird/fishery interactions.

Another recent initiative, Executive Order 13186, signed January 2001, requires every Federal agency that takes action(s) likely to have a measurable negative impact on migratory birds to enter into a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service, which is the lead federal agency for managing and conserving seabirds. The MOU is to outline how an agency will promote the conservation of migratory birds and is published in the *Federal Register*. Other obligations under E.O. 13186 include supporting various conservation planning efforts already underway (e.g., Partners in Flight initiative and the North American Waterfowl Management Plan) and incorporating bird conservation considerations into agency planning. The latter includes considering impacts on migratory birds while conducting National Environmental Policy Act (NEPA) analyses and reporting annually on the level of take that is occurring.

NOAA Fisheries is currently drafting an MOU with the U.S. Fish and Wildlife Service. The NPOA and E.O. 13186, together with existing law, provide guidance to NOAA Fisheries in pursuing ways to better measure, monitor and reduce bycatch of seabirds in fishing operations both domestically and internationally.

To date, no specific seabird/gear interaction assessments have been conducted for the fisheries managed by the South Atlantic Council. As part of NOAA Fisheries regional implementation of national seabird directives, the Council has participated in ISWG meetings and has contributed to the progress/status report on seabird bycatch assessments in longline

fisheries in the form of providing detailed descriptions of longline fisheries currently managed by the South Atlantic Council.

7.12 National Environmental Policy Act

Concerned with the degree of damages incurred by human activity on the sensitive ecological environment in the United States, Congress passed, and Richard Nixon signed into law, the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. §§ 4321 *et seq.* NEPA sets the national environmental policy by providing a mandate and framework for federal agencies to consider all reasonably foreseeable environmental effects of their actions. In addition, it requires disclosure of information regarding the environmental impacts of any federal or federally funded action to public officials and citizens before decisions are made and actions taken. The analysis and results are presented to the public and other agencies through the development of NEPA documentation. The Environmental Assessment integrated into Amendment 13A to the FMP serves as the documentation to satisfy the requirements of NEPA.

7.13 National Marine Sanctuaries Act

Under the National Marine Sanctuaries Act (NMSA) (also known as Title III of the Marine Protection, Research and Sanctuaries Act of 1972), as amended, the U.S. Secretary of Commerce is authorized to designate National Marine Sanctuaries to protect distinctive natural and cultural resources whose protection and beneficial use requires comprehensive planning and management. The National Marine Sanctuary Program is administered by the Sanctuaries and Reserves Division of the NOAA. The Act provides authority for comprehensive and coordinated conservation and management of these marine areas. The National Marine Sanctuary Program currently comprises 13 sanctuaries around the country, including sites in American Samoa and Hawaii. These sites include significant coral reef and kelp forest habitats, and breeding and feeding grounds of whales, sea lions, sharks, and sea turtles. Gray's Reef and Florida Keys are the two marine sanctuaries in the South Atlantic EEZ.

7.14 Paperwork Reduction Act

The purpose of the Paperwork Reduction Act is to control paperwork requirements imposed on the public by the federal government. The authority to manage information collection and record keeping requirements is vested with the Director of the Office of Management and Budget. This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

The Council is not proposing in this amendment measures that would involve increased paperwork and consideration under this Act.

7.15 Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) of 1980 (5 U.S.C. 601 *et seq.*) requires Federal agencies to assess the impacts of regulatory actions implemented through notice and comment rulemaking procedures on small businesses, small organizations, and small governmental entities, with the goal of minimizing adverse impacts of burdensome regulations and record-keeping requirements on those entities. Under the RFA, NOAA Fisheries must determine whether a proposed fishery regulation would have a significant

7.0 Other Applicable Law

economic impact on a substantial number of small entities. If not, a certification to this effect must be prepared and submitted to the Chief Counsel for Advocacy of the Small Business Administration. Alternatively, if a regulation is determined to significantly impact a substantial number of small entities, the Act requires the agency to prepare an initial and final Regulatory Flexibility Analysis to accompany the proposed and final rule, respectively. These analyses, which describe the type and number of small businesses affected, the nature and size of the impacts, and alternatives that minimize these impacts while accomplishing stated objectives, must be published in the *Federal Register* in full or in summary for public comment and submitted to the chief counsel for advocacy of the Small Business Administration. Changes to the RFA in June 1996 enable small entities to seek court review of an agency's compliance with the Act's provisions.

7.16 Small Business Act

Enacted in 1953, the Small Business Act requires that agencies assist and protect small-business interests to the extent possible to preserve free competitive enterprise.

7.17 Vessel Safety

Public Law 99-659 amended the MSFCMA to require that a FMP or FMP amendment must consider, and may provide for, temporary adjustments (after consultation with the U.S. Coast Guard and persons utilizing the fishery) regarding access to a fishery for vessels that would be otherwise prevented from participating in the fishery because of safety concerns related to weather or to other ocean conditions.

No vessel would be forced to participate in the snapper grouper fishery under adverse weather or ocean conditions as a result of the imposition of management regulations proposed in this amendment.

No concerns have been raised by people engaged in the fishery nor by the U.S. Coast Guard that the proposed management measures directly or indirectly pose a hazard to crew or vessel safety under adverse weather or ocean conditions. Therefore, this amendment proposes neither procedures for making management adjustments due to vessel safety problems nor procedures to monitor, evaluate, or report on the effects of management measures on vessel or crew safety under adverse weather or ocean conditions.

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9.0 **FINDING OF NO SIGNIFICANT IMPACT (FONSI)**

The preferred alternative to continue the regulations prohibiting fishing for and retention of snapper grouper species in the *Oculina* Experimental Closed Area for an indefinite period of time, and to evaluate the size and configuration of the closed area and the effectiveness of the prohibition after a three-year and ten-year period, respectively, would not significantly affect the quality of the human environment. This finding of no significant impact (FONSI) incorporates by reference all discussions and conclusions contained in the Environmental Assessment (EA) integrated in this amendment. Sections 9.1 and 9.2 summarize the EA and key findings supporting this FONSI, respectively. Section 9.3 contains the FONSI statement.

9.1 **Summary of the Environmental Assessments**

9.1.1 **Proposed Action**

The proposed action would extend regulations that prohibit fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area of the South Atlantic Exclusive Economic Zone. The purpose of this action is to continue to protect affected snapper grouper species by providing a buffer against the high degree of uncertainty inherent in the management of these species and to continue to protect *Oculina* coral by eliminating potential adverse impacts to this species caused by hook-and-line gear.

9.1.2 **Key Issues**

The key biological, social, and economic issues associated with the proposed action are identified in Section 1.3.3 of this document.

9.1.3 **Alternatives Considered**

If NOAA Fisheries did not take action, regulations prohibiting fishing for and retention of snapper grouper species in the *Oculina* Experimental Closed Area would expire on June 27, 2004. Five alternatives to no action were considered to satisfy the purpose of and need for the proposed action, as described in Section 1.2.

The South Atlantic Council's preferred Alternative 1 would continue the regulations prohibiting fishing for and retention of snapper grouper species in the *Oculina* Experimental Closed Area for an indefinite period of time. This alternative would require the Council to review this decision ten years following the publication of the final rule implementing this regulation, and to review the configuration and size of the *Oculina* Experimental Closed Area within three years of the publication date of the final rule.

Alternatives 2-4 would specify that the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area sunset after 10, 20, or 50 years, respectively. These alternatives would not schedule a re-evaluation of the regulations until the sunset date, at which time the Council could decide to extend them for an additional period of time. Alternative 5 would extend the regulations for an indefinite period of time, with no scheduled re-evaluation. Other alternatives that were considered during the preparation of this amendment, but eliminated from more detailed study, are described in Appendix A.

9.2 Significance Findings

The Council on Environmental Quality regulations implementing the National Environmental Policy Act and NOAA's Administrative Order (NAO) 216-6 require that decision-makers take into account both context and intensity when evaluating the significance of impacts resulting from a major Federal action (40 CFR 1508.27; NAO 216-6, Section 6.01(b)). Evaluating significance with respect to context requires consideration of the local, regional, national, and/or global impacts of the action. Intensity refers to the severity of the impact, and is to be evaluated using specific criteria outlined at 40 CFR 1508.27(b) and at NAO 216-6, Section 6.01(b). The key findings of the South Atlantic Council/NOAA Fisheries related to the significance of the impacts associated with the preferred alternative follow. The findings are organized under the intensity criteria and include a consideration of the context in which the impacts occur.

9.2.1 Impacts may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial (40 CFR §1508.27(b)(1); NAO 216-6, Section 6.01(b)(1)).

The preferred alternative is expected to provide biological benefits at the local, regional, national, and global level. Extending the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area is expected to assist in recovering local populations of snapper grouper species and of *Oculina* coral. However, the effect of this regulation is expected to be minimal, as the prohibition would affect only a small portion of snapper grouper fishermen who use hook-and-line gear (or other gear that is not currently prohibited within the *Oculina* Experimental Closed Area) and who can effectively target snapper grouper species without using an anchor. The period of time it will take local populations to recover cannot be determined based on available information, but is expected to be lengthy given what we know about the biology of the affected species. Prey species could decrease in abundance within the *Oculina* Experimental Closed Area as snapper grouper populations recover. This would not be perceived as an adverse impact, but rather as an ecological benefit, as it would indicate that the reef fish community is in the process of recovering to a natural predator-prey balance.

The snapper grouper prohibition is expected to benefit regional populations of affected species by protecting a portion of those populations from directed fishing mortality. Potential spillover effects associated with larval transport and/or the migration of juvenile and adult fishes outside of the closed area cannot be quantified, but can be reasonably expected to occur to some degree. Such effects are expected to be minimal, as the prohibition would apply to just a 92 nm² area, and would not likely be observed for some period of time given what we know about the biology of the affected species.

The seven communities described in Section 3.2.3 are expected to experience local social and economic impacts. These impacts are expected to be adverse in the short-term, but beneficial in the long-term if the area is reopened to snapper grouper fishing or if anticipated spillover effects are realized. Whether beneficial or adverse, the social and economic impacts of this action are expected to be minimal, as the prohibition would affect only a small portion of snapper grouper fishermen who use hook-and-line gear (or other gear that is not currently prohibited within the *Oculina* Experimental Closed Area) and who can effectively target snapper grouper species without using an anchor. Spillover effects would be expected to provide minimal social and economic benefits at the regional level as well, by contributing to broader recovery efforts. Some non-use benefits are expected to accrue at the regional, national, and

global levels from minimizing anthropogenic impacts to the affected area, which is considered to be unique and to function as a national and world heritage or legacy value.

9.2.2 The degree to which the proposed action affects public health or safety (40 CFR §1508.27(b)(2); NAO 216-6, Section 6.01(b)(2)).

The preferred alternative would not result in changes to current fishery practices or operations. The Council has prohibited fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area since 1994, and is not aware of any public health and/or safety concerns associated with this regulation. Consequently, the preferred alternative to extend the prohibition for an indefinite period of time is not expected to affect public health or safety at the local, regional, national, or global level.

9.2.3 Unique characteristics of the geographic area, such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas (40 CFR §1508.27(b)(3); NAO 216-6, Section 6.01(b)(3)).

The Council considers the *Oculina* Experimental Closed Area to be an ecologically critical area because it encompasses unique populations of *Oculina* coral, which support diverse populations of invertebrates and finfish species. Continuing to protect populations of *Oculina* coral located within the *Oculina* Experimental Closed Area from the potential adverse impacts associated with snapper grouper hook-and-line gear is expected to benefit this delicate, slow-growing species. However, the effect of this regulation is expected to be minimal compared to that of existing regulations prohibiting the use of bottom trawls, bottom longlines, dredges, fish traps, and fish pots, and anchors within the affected area. Some non-use benefits are expected to accrue at the regional, national, and global levels from minimizing anthropogenic impacts to this ecologically critical area.

9.2.4 The degree to which the effects on the quality of the human environment are likely to be highly controversial (40 CFR §1508.27(b)(4); NAO 216-6, Section 6.01(b)(4)).

Appendix A summarizes the public comments received by the Council during the preparation of this amendment. More than 550 of the approximately 650 written comments submitted to the Council favored extending the regulations. However, those individuals who participated in the public hearing held June 2003 were equally divided in their support for and against the proposed action.

The Council's decision to extend the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area is somewhat controversial, largely because those who oppose the extension perceive that this and other regulations governing fishing in the closed area have not been effectively enforced in the past, and because the science informing the Council's decision to extend the regulations is uncertain.

Actions taken by the Council and NOAA Fisheries to address enforcement concerns are outlined in Section 3.1.2.4.2. Additionally, the Council modified the preferred alternative in response to comments received during the public hearing in June 2003 to provide for a scheduled re-evaluation of the configuration and size of the *Oculina* Experimental Closed Area and of the effectiveness of the closed area in the context of the Council's stated purpose of and need for action.

9.2.5 The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks (40 CFR §1508.27(b)(5); NAO 216-6, Section 6.01(b)(5)).

Section 4.0 describes the possible impacts of the preferred alternative on the human environment. These impacts are not considered to involve unique or unknown risks, as spatial area management strategies have long been used as a fishery management tool. The biological and ecological benefits of continuing protections to local populations of affected species located within the *Oculina* Experimental Closed Area are fairly certain. However, the social and economic impacts experienced at the local level are uncertain. Neither the biological and ecological benefits, nor the social and economic impacts, are expected to be significant, as the regulations affect only a small subset of snapper grouper fishermen who use hook-and-line gear (or other gear that is not currently prohibited within the *Oculina* Experimental Closed Area) and who can effectively target snapper grouper species without using an anchor.

The biological, ecological, social, and economic impacts experienced at the regional level are believed to be positive. But these benefits also are uncertain, as the degree to which spillover effects would contribute to stock rebuilding remains unknown. As noted in Section 9.2.1, the regional impacts of continuing the snapper grouper prohibition are expected to be minimal, as the regulation would apply to just a 92 nm² area.

9.2.6 The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration (40 CFR §1508.27(b)(6); NAO 216-6, Section 6.01(b)(6)).

The preferred alternative would not be precedent setting or represent a decision in principle about a future consideration. Spatial area management strategies are commonly used in marine fisheries management.

9.2.7 Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small components (40 CFR §1508.27(b)(7); NAO 216-6, Section 6.01(b)(7)).

Section 4.7.4 describes the cumulative impacts of the preferred alternative on the human environment. The impacts of extending the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area, when combined with past and reasonably foreseeable future actions, are expected to be beneficial to affected species and to the surrounding ecosystem. The cumulative social and economic impacts are believed to be somewhat mixed in the short-term (e.g., negative to affected user groups; positive to interested non-user groups), but positive in the long-term. Data limitations preclude us from determining the magnitude of these effects. However, the preferred alternative is expected to contribute to these effects in a minimal way because it would affect a small subset of participants in the snapper grouper fishery, a small subset of gear types, and a limited area.

9.2.8 The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources (40 CFR §1508.27(b)(8); NAO 216-6, Section 6.01(b)(8)).

The preferred alternative would not affect any of the above-listed resources.

9.2.9 The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973 (40 CFR §1508.27(b)(9); NAO 216-6, Section 6.01(b)(9)).

Continuing protections to snapper grouper species and other species located within the *Oculina* Experimental Closed Area would not adversely affect endangered or threatened species or critical habitat. As noted in Section 4.2.1, the preferred alternative is expected to continue benefits to sea turtles and to candidate species by reducing the interactions of these species with snapper grouper hook-and-line gear. However, these benefits are expected to be minimal as the prohibition would apply to just a 92 nm² area. The full Biological Evaluation of the effect of the proposed action on endangered and threatened species is contained in Appendix C. This evaluation is required by Section 7 of the Endangered Species Act.

9.2.10 Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment (40 CFR §1508.27(b)(10); NAO 216-6, Section 6.01(b)(10)).

The preferred alternative to extend the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area would not violate state or local environmental protection efforts, and would not conflict with Federal laws or regulations applicable to the U.S. EEZ and described in Section 7.0.

9.2.11 Whether the action may result in the introduction or spread of a non-indigenous species (NAO 216-6, Section 6.01(b)(11)).

Anecdotal information suggests that lionfishes (*Pterois* spp.) could be present in the *Oculina* Experimental Closed Area. The preferred alternative would not result in the introduction or spread of these or other non-indigenous species. It could limit the spread of non-indigenous species by increasing the abundance of predaceous snapper grouper species.

9.3 FONSI Statement

FONSI STATEMENT: In view of the analyses presented in Amendment 13A to the Snapper Grouper FMP and in the Environmental Assessment, the proposed action will not significantly affect the quality of the human environment with specific reference to the criteria contained in NOAA Administrative Order 216-6 implementing the National Environmental Policy Act. Accordingly, the preparation of a Supplemental Environmental Impact Statement for this proposed action is not necessary.

William T. Hogarth
Assistant Administrator for Fisheries, NOAA

Date

10.0 APPENDICES

Appendix A. Summary of Scoping Activities and Public Comments

The below appendix is a summary of scoping activities and public comments, in addition to alternatives the Council considered but were eliminated from detailed study and a brief discussion of the reasons for being eliminated.

1.0 Background

The proposed action to extend the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area was originally combined with multiple other actions that the South Atlantic Council is evaluating to bring the Snapper Grouper FMP into compliance with new requirements added to the M-SFCMA through the 1996 Sustainable Fisheries Act. Those actions were being evaluated in Amendment 13 to the Snapper Grouper FMP. A Notice of Intent to prepare a Supplemental EIS to support that amendment was published in the *Federal Register* on January 31, 2002 [67 FR 4696].

In March 2003, the Council voted to separate the actions in Amendment 13 into two separate amendments. The proposed action to extend the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area is being evaluated in Amendment 13A to the Snapper Grouper FMP. All other actions in Amendment 13 are now being evaluated in Amendment 13B to the Snapper Grouper FMP. The purpose of this separation was to ensure that the Council had the information it needed to make a decision on whether to extend the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area before the regulations implementing that prohibition sunset as scheduled in June 2004.

The preliminary environmental review of the proposed action in this amendment indicated that it would not likely have a significant impact on the quality of the human environment. Consequently, the Council and NOAA Fisheries jointly prepared an Environment Assessment (EA) to make the determination of whether to prepare a Draft SEIS or a Finding Of No Significant Impact (FONSI). That EA, which is integrated in this amendment, resulted in a FONSI. The FONSI is contained in Section 10.0. The notice changing to an EA was published in the *Federal Register* on September 12, 2003.

2.0 Scoping Process

The Council held two scoping meetings on potential actions to be considered in Amendment 13 to the Snapper Grouper FMP. The first meeting was held March 5, 2001, in Jekyll Island, Georgia. The second meeting was held March 3, 2002, in Savannah, Georgia. The Council received no comments at these meetings on the proposed action to extend the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area.

The Council also has accepted written comments on the proposed action throughout the development of this amendment, and has listened to public testimony on the subject at hearings held in connection with scheduled Council meetings. The Council held a public hearing specific to Amendment 13A on Monday, June 16, 2003 at 6:00 PM, at the Hilton Cocoa Beach Oceanfront, 1150 North Atlantic Avenue, Cocoa Beach, Florida.

3.0 Summary of Public Comments on the Alternatives Considered in this Amendment

3.1 Written Comments

The Council received over 650 written comments from individuals on the Public Hearing Draft of Snapper Grouper Amendment 13A. More than 550 of these written comments favored extending the regulations that prohibit fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area for an additional 10-year period. An additional 70 written comments also favored extending the regulations, but did not specify a time period for the extension. A few comments endorsed alternatives to extend the regulations for an additional 20-year period or indefinitely. The Council received 3 written comments in favor of allowing the regulations that prohibit fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area to sunset in June 2004. The Council also received comments suggesting alternatives to the proposed extension. Those are discussed further in Section 9.4.

Written comments received by the Council from organizations included a letter from the Port St. Lucie Anglers Club, which supported extending the snapper grouper prohibition in the *Oculina* Experimental Closed Area for an additional 10 years contingent upon an increase in law enforcement efforts. The Council's Habitat and Environmental Protection and Coral Advisory Panels submitted a written comment that reflected their consensus to endorse the alternative that would extend the snapper grouper prohibition for an additional 10-year period. The World Wildlife Fund and Environmental Defense also endorsed that alternative. Written comments submitted by The Ocean Conservancy supported the Council's intent to extend the regulations that protect snapper grouper in the *Oculina* Experimental Closed Area, but requested that the extension be indefinite. That organization also recommended that the Council require a schedule of times for monitoring and reporting on the effectiveness of the *Oculina* Experimental Closed Area and provide guidance on specific enforcement measures. Reefkeeper International submitted a written comment in support of the alternative to extend the snapper grouper prohibition within the *Oculina* Experimental Closed Area for an additional 20-year period.

Finally, the Council received a petition with 288 signatures attached. The petition also was in favor of extending the snapper grouper prohibition within the *Oculina* Experimental Closed Area for an additional 20-year period.

3.2 Oral Comments

Approximately 50 people attended the June 2003 public hearing in Cocoa Beach, Florida. Approximately 20 of those in attendance spoke on the record. Public sentiment at the hearing appeared to be equally divided between those who wished to see the regulations that prohibit fishing for and retention of snapper grouper species in the *Oculina* Experimental Closed Area extended and those who wished to see the regulations sunset. Many individuals who opposed the extension offered alternatives. Section 9.5 summarizes those alternatives that were considered by the Council at its June 2003 meeting, but eliminated from more detailed study in this amendment.

3.3 Response to Comments

The Council passed two motions at its June 2003 meeting in response to feedback on the Public Hearing Draft of Amendment 13A to the Snapper Grouper FMP provided through the scoping process. Through the first motion, the Council made two modifications to the preferred alternative in the Public Hearing Draft of Amendment 13A, which proposed to extend the regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area for an additional ten-year period.

The first modification removed the sunset provision from the proposed ten-year extension. The second modification added a requirement that the Council review the configuration and size of the *Oculina* Experimental Closed Area within three years of the publication of the final rule implementing Amendment 13A to the Snapper Grouper FMP. Consequently, if this revised preferred alternative were to be adopted and implemented, the Council would conduct reviews of the *Oculina* Experimental Closed Area after a three-year and a ten-year period, but the continuation of regulations prohibiting fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area would not be dependent on additional action by the Council.

Through the second motion, the Council requested that a scientific research plan and an enforcement/outreach program be developed within one year of the implementation of regulations extending the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area.

4.0 Summary of Alternatives Considered, But Eliminated from More Detailed Study in this Amendment

This section describes alternatives to the proposed action that the Council considered in developing this document, but decided not to pursue. The description of each alternative is followed by a summary statement of why it was eliminated from more detailed study.

Rejected Alternative 1: Reduce the prohibition of fishing for and retention of snapper grouper species to a 10 nm² area, as suggested by Mr. Ron Rincones (MPA Advisory Panel Member) in an email dated May 6, 2002.

Rationale for elimination: A reduction in the size of the current closed area would not be expected to provide the degree of protection that is required to buffer snapper grouper stocks against the high degree of scientific uncertainty associated with the management of these species. The Council made the determination that the current size of the *Oculina* Experimental Closed Area is based on the best available information on the distribution of the *Oculina* coral and of the deepwater snapper grouper species that are associated with the coral. Additionally, if the size of the *Oculina* Experimental Closed Area were to be reduced from 92 nm² to 10 nm²,² some corals would be susceptible to damage from hook-and-line gear.

Rejected Alternative 2: While retaining the current configuration of the *Oculina* Experimental Closed Area, prohibit fishing for and retention of snapper grouper species during the seasons when the species are known to spawn in order to protect spawning populations.

Rationale for elimination: A time-limited spawning closure would not provide the degree of protection that is required to buffer snapper grouper stocks against scientific uncertainty. Seasonal closures would not protect the density, sex ratio, age structure, size structure, or community structure of fishes found in the *Oculina* Experimental Closed Area. Fishing effort applied outside the closed season could remove from the area the largest, oldest individuals with the best genetic makeup and greatest reproductive potential. Additionally, fishing tends to remove the apex predators, which can alter the community structure of reef ecosystems.

Reef fishes tend to have complex social behavior that controls spawning and sex change (McGovern et al. 1998; Koenig et al. 1999). Sex change in species such as gag, scamp, snowy

grouper, and red porgy is probably cued by the presence or absence of large dominant males and females. When these large animals are removed before sex change occurs in the population, the sex ratio may be altered. These cues for sex change probably occur outside of the spawning season. Some species, such as gag and scamp, are believed to form aggregations before the start of the spawning season and these aggregations may persist for a period of time after spawning ends. Fish aggregations are very susceptible to fishing pressure. Additionally, seasonal closures would not protect *Oculina* from potentially adverse impacts associated with hook-and-line gear.

Rejected Alternative 3: While retaining the current configuration of the *Oculina* Experimental Closed Area, prohibit fishing for and retention of snapper grouper species within that area only during the gag spawning season, which occurs from February to April, as suggested by Mr. Ron Rincones (MPA Advisory Panel Member) at the June 2003 public hearing.

Rationale for elimination: A February to April seasonal closure would not provide the same degree of protection to the density, sex ratio, age structure, size structure or community structure of snapper grouper species as would an annual closure. Fishing effort applied outside the closed season could remove from the area the largest, oldest individuals with the best genetic makeup and greatest reproductive potential. Additionally, fishing tends to remove the apex predators, which can alter the community structure of reef systems.

Off southeast Florida, McGovern et al. (1998) determined that female gag were in spawning condition from December through May. Gag probably begin to form spawning aggregations before the spawning season, and these aggregations remain intact for a period of time after spawning concludes in May. Therefore, aggregations of gag would still be available to fishing gear outside a February to April closure.

While female gag may move long distances, it is believed that most male gag remain in deep water (such as the *Oculina* Experimental Closed Area) throughout the year and move very little (Koenig et al. 1999; McGovern et al. (in review); McGovern et al. 1998;). Therefore, male gag that may be protected by an annual closure of the *Oculina* Experimental Closed Area would not be protected by a seasonal closure of the same area. When considering the effectiveness of seasonal closures in protecting gag, Koenig et al. (1999) concluded: "Clearly, a spawning season closure would be ineffective in restoring the proportion of males in the population, and therefore in protecting the integrity and productivity of the spawning aggregations. Closed seasons will not protect male gag, as most are caught after spawning aggregation in both the Gulf of Mexico and in the Atlantic. Without sufficient males the 'seasonally protected' aggregations will remain dysfunctional."

Additionally, a seasonal closure would not provide maximum protection to *Oculina* coral, as the coral would be susceptible to damage from hook-and-line gear targeting snapper grouper species during the times when fishing is allowed.

Rejected Alternative 4: Close the *Oculina* Experimental Closed Area to all fishing activities.

Rationale for elimination: The need for the proposed action is to provide a hedge against the high degree of scientific uncertainty associated with the status of snapper grouper species, not pelagic species. Pelagic fisheries are not believed to adversely affect snapper grouper species or *Oculina* coral.

Rejected Alternative 5: Open the *Oculina* Experimental Closed Area to fishing, but adjust the current regulations (bag, size, and trip limits).

Rationale for elimination: A wide variety of regulatory measures are used to manage snapper grouper fisheries, including limited entry, bag limits, size limits, and trip limits. These regulatory measures differ from that proposed in this amendment because they cannot be expected to protect the density, sex ratio, age structure, size structure, or community structure of fishes. They allow for the removal of the largest, oldest individuals with the best genetic makeup and greatest reproductive potential. They also allow for the removal of apex predators, such as grouper, which can alter the stability and community structure of reef ecosystems.

Reef fishes tend to have complex social behavior that controls spawning and sex change (McGovern et al. 1998; Koenig et al. 1999). Sex change in species such as gag, scamp, snowy grouper, and red porgy is probably cued by the presence or absence of large dominant males and females. Conventional management measures could allow large fishes to be removed before they undergo a change in sex, which could alter the sex ratio of the population.

This alternative also differs from the proposed action in that it would not reduce bycatch and bycatch mortality of non-target and undersized target species within the *Oculina* Experimental Closed Area. The discard mortality of bycatch that occurs in that area is likely to be high, as fishes taken from such deepwater habitats are known to suffer trauma associated with the change in pressure as they are brought to the surface. Additionally, this alternative would not protect *Oculina* from the potential adverse impacts associated with targeting snapper grouper species with hook-and-line gear.

Rejected Alternative 6: Reduce the size of the *Oculina* Experimental Closed Area to include only Chapman's and Jeff's Reef as expressed by Dr. Grant Gilmore (Snapper Grouper Assessment Group Member) through both a written comment dated April 21, 2003 and a verbal comment at the June 2003 public hearing.

Rationale for elimination: If reduced in size, the closed area would not be expected to provide the degree of protection that is required to buffer snapper grouper stocks against the high degree of scientific uncertainty associated with the management of these species. For example, reducing the size of the closed area could allow fishing on spawning aggregations, as Dr. Gilmore acknowledged at the June 2003 public hearing that there could be other spawning sites within the *Oculina* Experimental Closed Area as currently defined. Furthermore, the shelf edge *Oculina* coral reef system is known from only the central eastern coast of Florida. The Council made the determination that the current size of the *Oculina* Experimental Closed Area is based on the best available information on the distribution of the *Oculina* coral and of the deepwater snapper grouper species that are associated with the coral. Additionally, if the size of the *Oculina* Experimental Closed Area were to be reduced, some coral would be susceptible to damage from hook-and-line gear.

Rejected Alternative 7: Eliminate the prohibition on fishing for and retention of snapper grouper species from 8 miles off the southern end and 5 miles off the northern end as expressed by Mr. Ron Rincones (MPA Advisory Panel member) at the June 2003 public hearing.

Rationale for elimination: If reduced in size, the closed area would not be expected to provide the degree of protection that is required to buffer snapper grouper stocks against the high degree of scientific uncertainty associated with the management of these species. Furthermore, the shelf edge *Oculina* coral reef system is known from only the central eastern coast of Florida. The Council made the determination that the current size of the *Oculina* Experimental Closed Area is based on the best available information on the distribution of the *Oculina* coral and of the deepwater snapper grouper species that are associated with the coral. Additionally, if the size of the *Oculina* Experimental Closed Area were to be reduced, some corals would be susceptible to damage from hook-and-line gear.

Rejected Alternative 8: Allow recreational fishing only in the *Oculina* Experimental Closed Area.

Rationale for elimination: This alternative would still allow for the possibility of depleting local populations of snapper grouper species, and would not protect the density, sex ratio, age structure, size structure, or community structure of fishes found in the *Oculina* Experimental Closed Area. Furthermore, it would not protect *Oculina* coral from potential adverse impacts associated with targeting snapper grouper species with hook-and-line gear.

References

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Appendix B. South Atlantic Council Policies for Protection and Restoration of Essential Fish Habitat

(MARCH 2003) POLICIES FOR THE PROTECTION AND RESTORATION OF ESSENTIAL FISH HABITATS FROM ENERGY EXPLORATION, DEVELOPMENT AND TRANSPORTATION

Policy Context

This document establishes the policies of the South Atlantic Fishery Management Council (SAFMC) regarding protection of the essential fish habitats (EFH) and habitat areas of particular concern (EFH-HAPCs) associated with energy exploration, development and transportation. The policies are designed to be consistent with the overall habitat protection policies of the SAFMC as formulated and adopted in the Habitat Plan (SAFMC 1998a), the Comprehensive EFH Amendment (SAFMC 1998b) and the various FMPs of the Council.

The findings presented below assess the threats to EFH potentially posed by activities related to the energy development in offshore, coastal ocean and adjacent habitats, and the processes whereby those resources are placed at risk. The policies established in this document are designed to avoid, minimize and offset damage caused by these activities, in accordance with the general habitat policies of the SAFMC as mandated by law.

EFH At Risk from Energy Exploration, Development and Transportation Activities

The SAFMC finds:

- 1) That oil or gas drilling for exploration or development on or closely associated with Essential Fish Habitat (EFH) including Coral, Coral Reefs, and Live Hardbottom Habitat or Essential Fish Habitat - Habitat Areas of Particular Concern (EFH-HAPCs), or other special biological resources essential to commercial and recreational fisheries under Council jurisdiction, be prohibited.
- 2) That all facilities associated with oil and gas exploration, development, and transportation be designed to avoid impacts on coastal wetlands and sand sharing systems.
- 3) That adequate spill containment and cleanup equipment be maintained for all development and transportation facilities and, that the equipment be available on site within the trajectory time to land, and have industry post a bond to assure labor or other needed reserves.
- 4) That exploration and development activities should be scheduled to avoid northern right whales in coastal waters off Georgia and Florida as well as migrations of that species and other marine mammals off South Atlantic States.
- 5) That the Environmental Impact Statement (EIS) for any Lease Sale address impacts from activities specifically related to natural gas production, safety precautions which must be

developed in the event of a discovery of a “sour gas” or hydrogen sulfide reserve and the potential for southerly transport of hydrocarbons to nearshore and inshore estuarine habitats resulting from the cross-shelf transport by Gulf Stream spin-off eddies. The EIS should also address the development of contingency plans to be implemented if problems arise due to the very dynamic oceanographic conditions and the extremely rugged bottom, the need for and availability of onshore support facilities in coastal North and South Carolina, and an analysis of existing facilities and community services in light of existing major coastal developments.

Energy development activities have the potential to cause impacts to a variety of habitats across the shelf, including:

- waters and benthic habitats near the drilling sites,
 - waters between drilling sites,
 - waters and benthic habitats in or near the sites, and
 - waters and benthic habitats potentially affected as sediments move subsequent to deposition in fill areas.
- 6) Certain nearshore and offshore habitats are particularly important to the long-term viability of commercial and recreational fisheries under SAFMC management and potentially threatened by oil and gas and other energy exploration, development, and transportation:
- a) coral, coral reef and live bottom habitat,
 - b) estuarine wetlands, and
 - c) submerged aquatic vegetation.
- 7) Sections of South Atlantic waters potentially affected by these projects, both individually and collectively, have been identified as EFH or EFH-HAPC by the SAFMC. Potentially affected species and their EFH under Federal management include (SAFMC 1998b):
- a) summer flounder (various nearshore waters, including the surf zone and inlets; certain offshore waters),
 - b) bluefish (various nearshore waters, including the surf zone and inlets),
 - c) red drum (ocean high-salinity surf zones and unconsolidated bottoms in the nearshore),
 - d) many snapper and grouper species (live hardbottom from shore to 600 feet, and – for estuarine-dependent species (e.g., gag grouper and gray snapper) – unconsolidated bottoms and live hardbottoms to the 100 foot contour),
 - e) black sea bass (various nearshore waters, including unconsolidated bottom and live hardbottom to 100 feet, and hardbottoms to 600 feet),
 - f) penaeid shrimp (offshore habitats used for spawning and growth to maturity, and waters connecting to inshore nursery areas, including the surf zone and inlets),
 - g) coastal migratory pelagics (e.g., king mackerel, Spanish mackerel) (sandy shoals of capes and bars, barrier island ocean-side waters from the surf zone to the shelf break inshore of the Gulf Stream; all coastal inlets),
 - h) corals of various types (hard substrates and muddy, silt bottoms from the subtidal to the shelf break), and

- i) areas identified as EFH for Highly Migratory Species managed by the Secretary of Commerce (e.g., sharks: inlets and nearshore waters, including pupping and nursery grounds).
- 8) Many of the habitats potentially affected by these activities have been identified as EFH-HAPCs by the SAFMC. The general activity and specific fishery management plan is provided:
- a) all nearshore hardbottom areas - transportation and development (SAFMC snapper grouper),
 - b) all coastal inlets - transportation (SAFMC penaeid shrimp, red drum, and snapper grouper),
 - c) nearshore spawning sites transportation and development (SAFMC penaeid shrimps and red drum),
 - d) benthic *Sargassum* (SAFMC snapper grouper),
 - e) from shore to the ends of the sandy shoals of Cape Lookout, Cape Fear, and Cape Hatteras, North Carolina; Hurl Rocks, South Carolina; and *Phragmatopoma* (worm reefs) reefs off the central coast of Florida and near shore hardbottom south of Cape Canaveral (SAFMC coastal migratory pelagics),
 - f) Atlantic coast estuaries with high numbers of Spanish mackerel and cobia from ELMR, to include Bogue Sound, New River, North Carolina; Broad River, South Carolina (SAFMC coastal migratory pelagics),
 - g) Florida Bay, Biscayne Bay, Card Sound, and coral hardbottom habitat from Jupiter Inlet through the Dry Tortugas, Florida (SAFMC spiny lobster),
 - h) Hurl Rocks (South Carolina); The *Phragmatopoma* (worm reefs) off central east coast of Florida; nearshore (0-4 meters; 0-12 feet) hardbottom off the east coast of Florida from Cape Canaveral to Broward County; offshore (5-30 meters; 15-90 feet) hardbottom off the east coast of Florida from Palm Beach County to Fowey Rocks; Biscayne Bay, Florida; Biscayne National Park, Florida; and the Florida Keys National Marine Sanctuary (SAFMC Coral, Coral Reefs and Live Hardbottom Habitat), and
 - i) EFH-HAPCs designated for HMS species (e.g., sharks) in the South Atlantic region (NMFS Highly Migratory Species).
- 9) Habitats likely to be affected by oil and gas exploration, development and transportation include many recognised in State level fishery management plans. Examples of these habitats include Critical Habitat Areas (CHAs) established by the North Carolina Marine Fisheries Commission, either in FMPs or in Coastal Habitat Protection Plans.
- 10) Recent work by scientists in east Florida has documented exceptionally important habitat values for nearshore, hardbottom used by over 500 species of fishes and invertebrates, including juveniles of many reef fishes. Equivalent scientific work is just beginning in other South Atlantic States, but life histories suggest that similar habitat use patterns will be found.

Threats to Marine and Estuarine Resources from Energy Exploration, Development and Transportation Activities

The SAFMC finds that energy exploration, development and transportation activities threaten or potentially threaten EFH through the following mechanisms:

- Direct mortality and displacement of organisms at and near drilling sites,
- Elevated turbidity and deposition of fine sediments down-current from drilling sites,
- Elevated turbidity in and near drilling sites,
- Direct mortality occurring from oil spills from pipelines or from a vessel in transit near or close to inlet areas, of larvae, post-larvae, juveniles and adults of marine and estuarine organisms, and
- Alteration of long-term shoreline migration patterns (inducing further ecological cascades with consequences that are difficult to predict).

In addition, the interactions between cumulative and direct (sub-lethal) effects among the above factors certainly triggers non-linear impacts that are completely unstudied.

SAFMC Policies for Energy Exploration, Development and Transportation Activities

The SAFMC establishes the following general policies related to energy exploration, development and transportation activities and related projects, to clarify and augment the general policies already adopted in the Habitat Plan and Comprehensive Habitat Amendment (SAFMC 1998a, SAFMC 1998b):

- 1) Projects should avoid, minimize and where possible offset damage to EFH and EFH-HAPCs.
- 2) Projects requiring expanded EFH consultation should provide detailed analyses of possible impacts to each type of EFH, with careful and detailed analyses of possible impacts to EFH-HAPCs and state CHAs, including short and long-term, and population and ecosystem scale effects. Agencies with oversight authority should require expanded EFH consultation.
- 3) Projects requiring expanded EFH consultation should provide a full range of alternatives, along with assessments of the relative impacts of each on each type of EFH, HAPC and CHAs.
- 4) Projects should avoid impacts on EFH, HAPCs and CHAs that are shown to be avoidable through the alternatives analysis and minimize impacts that are not.
- 5) Projects should include assessments of potential unavoidable damage to EFH and other marine resources using conservative assumptions.
- 6) Projects should be conditioned on the avoidance of avoidable impacts, and should include compensatory mitigation for all reasonably predictable impacts to EFH, taking into account uncertainty about these effects. Mitigation should be local, up-front and in-kind, and should be adequately monitored, wherever possible.

- 7) Projects should include baseline and project-related monitoring adequate to document pre-project conditions and impacts of the projects on EFH.
- 8) All assessments should be based upon the best available science and be appropriately conservative follow precautionary principles as developed for various Federal and State policies.
- 9) All assessments should take into account the cumulative impacts associated with other energy exploration, development and transportation projects that are geographically and ecologically related.
- 10) Support application of existing standards and requirements regulating domestic and international transportation of energy products including regulated waste disposal and emissions which are intended to minimize negative impacts on and preserve environmental quality of the marine environment.

The SAFMC recommends the following concerns and issues be addressed by the MMS prior to approval of any application for a permit to drill any exploratory wells in any Lease Sales in the South Atlantic and that these concerns and issues also be included in a new EIS for any future Outer Continental Shelf (OCS) Leasing Plan:

- 1) Identification of the on-site fisheries resources, including both pelagic and benthic communities, that inhabit, spawn, or migrate through the lease sites with special focus on those specific lease blocks where industry has expressed specific interest in the pre-lease phases of the leasing process. Particular attention should be given to critical life history stages. Eggs and larvae are most sensitive to oil spills, and seismic exploration has been documented to cause mortality of eggs and larvae in close proximity.
- 2) Identification of on-site species designated as endangered, threatened, or of special concern, such as shortnose sturgeon, striped bass, blueback herring, American shad, sea turtles, marine mammals, pelagic birds, and all species regulated under federal fishery management plans.
- 3) Determination of impacts of all exploratory and development activities on the fisheries resources prior to MMS approval of any applications for permits to drill in the Exploratory Unit area, including effects of seismic survey signals on fish behavior, eggs and larvae; temporary preclusion from fishing grounds by exploratory drilling, and permanent preclusion from fishing grounds by production and transportation.
- 4) Identification of commercial and recreational fishing activities in the vicinity of the lease or Exploratory Unit area, their season of occurrence and intensity.
- 5) Determination of the physical oceanography of the area through field studies by MMS or the applicant, including on-site direction and velocity of currents and tides, sea states, temperature, salinity, water quality, wind storms frequencies, and intensities and icing conditions. Such studies must be required prior to approval of any exploration plan submitted in order to have an adequate informational database upon which to base subsequent decision making on site-specific proposed activities.

- 6) Description of required existing and planned monitoring activities intended to measure environmental conditions, and provide data and information on the impacts of exploration activities in the lease area or the Exploratory Unit area.
- 7) Identification of the quantity, composition, and method of disposal of solid and liquid wastes and pollutants likely to be generated by offshore, onshore, and transportation operations associated with oil and gas exploration development and transportation.
- 8) Development of an oil spill contingency plan which includes oil spill trajectory analyses specific to the area of operations, dispersant-use plan including a summary of toxicity data for each dispersant, identification of response equipment and strategies, establishment of procedures for early detection and timely notification of an oil spill including a current list of persons and regulatory agencies to be notified when an oil spill is discovered, and well defined and specific actions to be taken after discovery of an oil spill.
- 9) Studies should include detailing seasonal surface currents and likely spill trajectories.
- 10) Mapping of environmentally sensitive areas (e.g., spawning aggregations of snappers and groupers); coral resources and other significant benthic habitats (e.g., tilefish mudflats) along the edge of the continental shelf (including the upper slope); the calico scallop, royal red shrimp, and other productive benthic fishing grounds; other special biological resources; and northern right whale calving grounds and migratory routes, and subsequent deletion from inclusion in the respective lease block(s).
- 11) Planning for oil and gas product transport should be done to determine methods of transport, pipeline corridors, and onshore facilities. Siting and design of these facilities as well as onshore receiving, holding, and transport facilities could have impacts on wetlands and endangered species habitats if they are not properly located.
- 12) Develop understanding of community dynamics, pathways, and flows of energy to ascertain accumulation of toxins and impacts on community by first order toxicity.
- 13) Determine shelf-edge down-slope dynamics and resource assessments to determine fates of contaminants due to the critical nature of canyons and steep relief to important fisheries (e.g., swordfish, billfish, and tuna).
- 14) Discussion of the potential adverse impacts upon fisheries resources of the discharges of all drill cuttings that may result from activities in, and all drilling muds that may be approved for use in the lease area or the Exploration Unit area including: physical and chemical effects upon pelagic and benthic species and communities including their spawning behaviors and effects on eggs and larval stages; effects upon sight feeding species of fish; and analysis of methods and assumptions underlying the model used to predict the dispersion and discharged muds and cuttings from exploration activities.
- 15) Discussion of secondary impacts affecting fishery resources associated with onshore oil and gas related development such as storage and processing facilities, dredging and dredged material disposal, roads and rail lines, fuel and electrical transmission line routes, waste disposal, and others.

SAFMC Policy and Position on Previous Oil and Gas Exploration Proposals

The SAFMC urged the Secretary of Commerce to uphold the 1988 coastal zone inconsistency determination of the State of Florida for the respective plans of exploration filed with Minerals Management Service (MMS) by Mobil Exploration and Producing North America, Inc. for Lease OCS-G6520 (Pulley Ridge Block 799) and by Union Oil Company of California for Lease OCS-G6491/6492 (Pulley Ridge Blocks 629 & 630). Both plans of exploration involved lease blocks lying within the lease area comprising the offshore area encompassed by Part 2 of Lease Sale 116, and south of 26° North latitude. The Council's objection to the proposed exploration activities was based on the potential degradation or loss of extensive live bottom and other habitat essential to fisheries under Council jurisdiction.

The SAFMC also supported North Carolina's determination that the plans of exploration filed with MMS by Mobil Exploration and Producing North America, Inc. for Lease OCS Manteo Unit are not consistent with North Carolina's Coastal Zone Management program.

The Council has expressed concern to the Outer Continental Shelf Leasing and Development Task Force about the proposed area and recommended that no further exploration or production activity be allowed in the areas subject to Presidential Task Force Review (the section of Sale 116 south of 26° N latitude).

The following section addresses the recommendations, concerns and issues expressed by the South Atlantic Council (Source: Memorandum to Regional Director, U.S. Fish and Wildlife Service, Atlanta, Georgia from Regional Director, Gulf of Mexico OCS Region dated October 27, 1995):

“The MMS, North Carolina, and Mobil entered into an innovative Memorandum of Understanding on July 12, 1990, in which the MMS agreed to prepare an Environmental Report (ER) on proposed drilling offshore North Carolina. The scope of the ER prepared by the MMS was more comprehensive than an EIS would be. The normal scoping process used in preparation of a NEPA-type document would not only ‘identify significant environmental issues deserving of study’ but also ‘de-emphasize insignificant issues, narrowing the scope’ (40 CFR 1500.4) by scoping out issues not ripe for decisions.

Of particular interest to North Carolina are not the transient effects of exploration, but rather the downstream and potentially broader, long-term effects of production and development. The potential effects associated with production and development would normally be “scoped out” of the (EIS-type) document and would be the subject of extensive NEPA analysis only after the exploration phase proves successful, and the submittal of a full-scale production and development program has been received for review and analysis. The ER addressed three alternatives: the proposed Mobil plan to drill a single exploratory well, the no-action alternative and the alternative that the MMS approve the Mobil plan with specific restrictions (monitoring programs and restrictions on discharges). The ER also analyzes possible future activities, such as development and production, and the long-term environmental and socioeconomic effects associated with such activities. The MMS assured North Carolina that all of the State's comments and concerns would be addressed in the Final ER (USDOI 1990).

The MMS also funded a Literature Synthesis study (USDOI MMS 1993a) and a Physical Oceanography study (USDOI MMS 1994), both recommended by the Physical Oceanography Panel and the Environmental Sciences Review Panel (ESRP). Mobil also submitted a draft report to the MMS titled *Characterization of Currents at Manteo Block 467 off Cape Hatteras, North Carolina*. The MMS also had a Cooperative Agreement with the Virginia Institute of

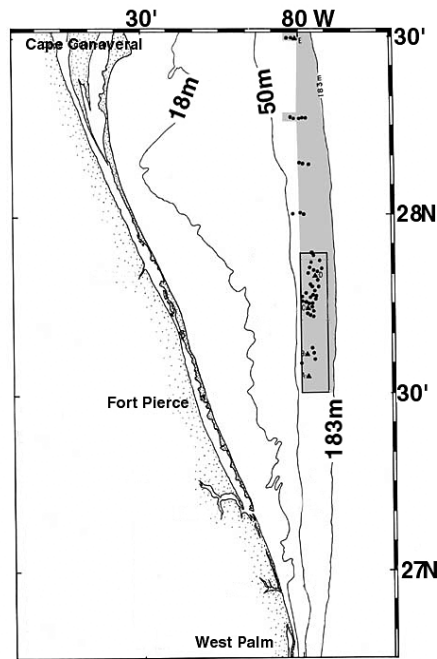
Marine Science to fund a study titled *Seafloor Survey in the Vicinity of the Manteo Prospect Offshore North Carolina* (USDOI MMS 1993b). The MMS had a Cooperative Agreement with East Carolina University to conduct a study titled *Coastal North Carolina Socioeconomic Study* (USDOI MMS 1993c). The above-mentioned studies were responsive to the ESRP's recommendations as well as those of the SAFMC and the State of North Carolina."

Copies of these studies can be acquired from the address below:
Minerals Management Service, Technical Communication Services
MS 4530 381 Elden Street
Herndon, VA 22070-4897 (703) 787-1080

References

- SAFMC. 1998a. Final Habitat Plan for the South Atlantic region: Essential Fish Habitat requirements for fishery management plans of the South Atlantic Fishery Management Council. South Atlantic Fishery Management Council, 1 Southpark Cir., Ste 306, Charleston, SC 29407-4699. 457 pp. plus appendices.
- SAFMC. 1998b. Final Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region. Including a Final Environmental Impact Statement /Supplemental Environmental Impact Statement, Initial Regulatory Flexibility Analysis, Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement. South Atlantic Fishery Management Council, 1 Southpark Cir., Ste 306, Charleston, SC 29407-4699. 136pp.
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- USDOI, MMS. 1994. North Carolina Physical Oceanographic Field Study. MMS 94-0047.

**Appendix C. Biological Evaluation for Amendment 13A to the Fishery Management Plan
for the Snapper Grouper Fishery of the South Atlantic Region**



August 2003

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Snapper grouper Amendment 13A-*Oculina* Experimental Closed Area

The proposed action is to extend protection of the *Oculina* Experimental Closed Area following the “sunset” date of June 27, 2004. The purpose of this action is to provide continued protection of snapper grouper populations and associated *Oculina* coral. The need for this action is to provide a hedge against the high degree of scientific uncertainty associated with the status of these species and to reduce the possibility that these populations may fall below sustainable levels. The Council wants to provide the highest level of protection to the *Oculina* coral in this area by prohibiting the use of all gears that may impact it. In addition, extending regulations that prohibit fishing for and retention of snapper grouper species in the *Oculina* Experimental Closed Area will support the following Snapper Grouper Management Objectives: 1) prevent overfishing, 2) collect necessary data, 3) evaluate and minimize local depletion, and 4) minimize bycatch.

Background

Oculina coral (*Oculina varicosa*) occurs along the South Atlantic shelf with concentrations found off the central east coast of Florida. These concentrations create a shelf-edge strip of reef called the *Oculina* Bank. *Oculina*, commonly known as Ivory Tree coral, grows on the limestone ridges and pinnacles which are distributed throughout the area. The Bank extends about 78 nautical miles (nm) along the shelf edge from Fort Pierce to Cape Canaveral ranging approximately 28 to 68 km (15 to 37 nm) offshore in depths of 55 to 137 m (30 to 75 fathoms).

Information from work conducted in the early 1980’s (Reed 1980; Reed et al. 1982), revealed that the *Oculina* Bank area supports a highly diverse deepwater ecosystem comparable to tropical reefs. Strong currents flowing through the area are thought to contribute to the growth of the coral by trapping fine sand, mud and coral debris which act as habitat for dense populations of mollusks and crustaceans. In turn, those creatures serve as food for many kinds of commercial and recreational fish including red porgy, greater amberjack, and many species of snapper and grouper. Because of this biological diversity, the area has been subjected to intense fishing pressure of which certain gear such as bottom trawls has had a devastating effect on the fragile coral. Due to the unique and delicate nature of the coral formation, and because it provides valuable habitat for economically important commercial and recreational snapper grouper species, the South Atlantic Council Fishery Management Council (SAFMC) concluded it was imperative to afford this area extra protection. In 1982, the SAFMC, through their Coral Fishery Management Plan (FMP), designated a 92 nm² section of the *Oculina* Bank as a Habitat Area of Particular Concern (HAPC), which took effect in 1984 (GMFMC and SAFMC 1982). This designation categorized it as an area of special biological significance worthy of stricter regulatory and enforcement activity. As such, use of all bottom trawls, bottom longlines, dredges and fish traps/pots was prohibited within the HAPC though fishermen could still anchor their boats and use weights to send baits to the bottom.

In 1993 the HAPC was also designated as the *Oculina* Bank Experimental Closed Area under Amendment 6 of the Snapper Grouper FMP (SAFMC 1993). Establishment of the *Oculina* Bank Experimental Closed Area was to “enhance stock stability and increase recruitment by providing an area where deep water species can grow and reproduce without being subjected to fishing mortality” (SAFMC 1993). This action took effect in 1994 and added prohibitions on fishing for species in the snapper grouper management complex and banned anchoring. However, under the

Snapper Grouper FMP, anchoring could only be banned with respect to vessels fishing for snapper grouper species. As such, in 1996 anchoring restrictions were expanded to include all fishing vessels through Amendment 3 to the Coral, Coral Reefs and Live/Hard Bottom Habitats of the South Atlantic Region FMP to protect the coral (SAFMC 1995). In that same year, an area surrounding the *Oculina* HAPC was closed to rock shrimp trawling under Amendment 1 to the Shrimp FMP (SAFMC 1995b).

In 2000, under Amendment 4 to the Coral FMP (included in the Comprehensive Amendment Addressing Essential Fish Habitat), the Council expanded the original HAPC to 300 nm² which represents the current boundaries extending the HAPC from Fort Pierce to Cape Canaveral, Florida (SAFMC 1998). This amendment also included two adjacent Satellite *Oculina* HAPCs and incorporated the prohibitions on trawling, all bottom tending gear and anchoring. Though the HAPC was enlarged, the size of the Experimental Closed Area remained the same.

Research and Monitoring

With the designation of the Experimental Closed Area, the South Atlantic Council recommended to NOAA Fisheries that continued research and monitoring be done to evaluate the utility of such an area closure in enhancing the long-term survival of species in the snapper grouper management complex.

In 1995, researchers revisited the same sites studied in the 1980s within the Experimental Closed Area. The survey revealed that much of the habitat designated for protection had already been damaged or destroyed from many years of trawling and dredging, reducing much of the area's coral to rubble. Declines had occurred in both the economically important fish populations and the grouper spawning aggregations that were described in the earlier studies. The scientists concluded that recovery of the overfished grouper population would not be possible without restoration of the *Oculina* Bank habitat. In 1996, the first live *Oculina* colonies were collected by a remotely operated vehicle (ROV), attached to concrete-block modules and placed on the sea floor. Restoration experiments were conducted from 1996 to 1999 to evaluate the transplantation potential of *Oculina*. Positive results prompted a restoration effort in 2000 and 2001.

A broad-scale submersible and ROV survey was conducted in September 2001. The results showed that approximately 90% of the *Oculina* habitat within the Experimental Closed Area has been reduced to rubble and that damage north of the closed area may be greater (Koenig 2001). There was strong evidence recorded during the 2001 survey that illegal bottom fishing, including trawling, was still occurring in the protected area. However, despite the overwhelming destruction of habitat, positive trends in fish populations within the remaining intact habitat of the closed area have been observed. Groupers have increased in both numbers and size and the greater occurrence of male gag and scamp have suggested reestablishment of spawning aggregations for both species. Restoration sites also appeared to be successful in attracting groupers, snappers and amberjacks and may possibly be sites of grouper spawning aggregations. In addition, juvenile speckled hind were observed in *Oculina* thickets indicating that this habitat may also function as a nursery for this species. This species, as well as the Warsaw grouper which also occurs in the HAPC, have declined to the point of being considered candidates for listing under the ESA. Thus any measures enhancing their recovery may help prevent a future listing from being necessary. Continued monitoring and habitat mapping is currently underway for this area (Koenig 2001).

Action Area

Amendment 13A addresses the *Oculina* Bank Experimental Closed Area located off east central Florida. The Experimental Closed Area is bounded on the north by 27°53' N. latitude, on the south by 27°30' N. latitude, on the east by 79°56' W. longitude and on the west by 80°00' W. longitude (Figure 1).

Within the *Oculina* Experimental Closed Area, bottom longline, bottom trawl, dredge, pot or trap gear is prohibited. Use of an anchor, anchor and chain, or a grapple and chain is also prohibited. In addition, within the *Oculina* Experimental Closed Area, fishing for snapper grouper species has been prohibited since 1994 though harvest of pelagic species such as dolphin, wahoo and sailfish is allowed. Pelagic species within the action area are targeted via trolling with hook-and-line gear. When fishing for pelagic species, vessels often troll eight lines from the boat with the use of outriggers. In addition to using more traditional rod and reel set-ups, many fishermen will also fish pelagic species with downriggers and planers. A downrigger is a unit that is fixed to the boat transom (or other location near the back of a boat) that allows the fisherman to execute controlled-depth trolling at almost any depth. A downrigger set-up uses heavy cable or a weighted line that is placed through the downrigger arm with a pulley system and descends straight down into the water below the boat and placed at a precise depth. Some downriggers can hold up to six individual lines, which give fishermen the ability to spread lures over a variety of depths.

When trolling with a downrigger, the fishing line and bait are attached to the downrigger cable or line via a small clip (or “release”). Once attached, the line and bait are taken down to the desired depth for trolling. Once a fish strikes the bait, the weighted line or cable line is jarred free from the clip, allowing the fisherman to fight the fish directly.

Planers work similarly to downriggers in that they allow fishermen to fish at a specific depth, however, these disk-shaped devices can be attached directly to conventional fishing line. Their unique shape produces resistance when pulled through the water, creating a diving action that pulls the bait behind it. The depth that the bait will run behind the planer is determined by how much line is set out as well as by the speed of the vessel. When a fish strikes the bait the line will disengage from the planer, allowing line to pass through with little or no resistance. Fishermen may employ multiple planers to cover different depths and distances from the boat.

As fishing for and retention of snapper grouper species are currently prohibited within the action area, any snapper grouper species incidentally taken by hook-and-line gear must be released immediately by cutting the line without removing the fish from the water.

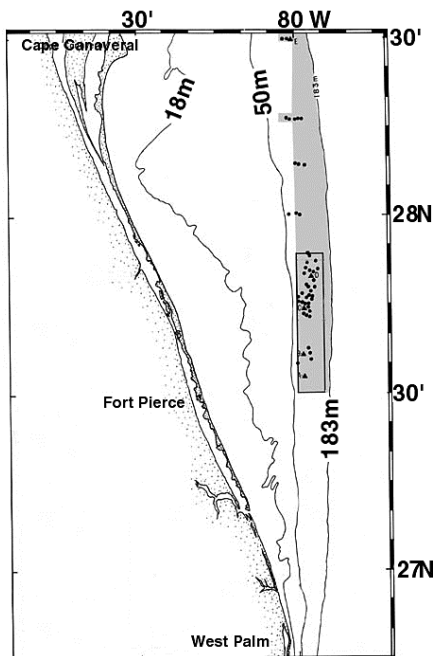


Figure 1. Location of the *Oculina* Experimental Closed Area.

Proposed Action and Alternatives

Alternatives for the Proposed Action

Alternative 1. **Preferred Alternative** - Extend regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an indefinite period with a 10-year re-evaluation by the Council. The Council will review the configuration and size of the *Oculina* Experimental Closed Area within 3-years of the publication date of the final rule.

Alternative 2. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 10-year period.

Alternative 3. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 20-year period.

Alternative 4. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an additional 50-year period.

Alternative 5. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper grouper species for an indefinite period.

Alternative 6. No action: The regulations that prohibit fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area will sunset on June 27, 2004.

Description of Listed and Candidate Species and Critical Habitats Occurring in the Southeast Atlantic Region

Section 7(a)(1) of the Endangered Species Act (ESA) of 1973, as amended, requires all federal agencies to participate in the conservation and recovery of listed threatened and endangered species. Section 7(a)(2) states that federal agencies must ensure that any activity they authorize, fund or carry out is not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of designated critical habitat.

A review of listed species and designated critical habitat(s) that occur in the area of proposed actions is provided in order to evaluate the likely effects of the action(s) on listed species or designated critical habitat occurring within the action area as required by Section 7(c) of the ESA.

Marine listed species and critical habitat designations in the eastern U. S.

Endangered

Blue whale	<i>Balaenoptera musculus</i>
Humpback whale	<i>Megaptera novaeangliae</i>
Fin whale	<i>Balaenoptera physalus</i>
Northern right whale	<i>Eubalaena glacialis</i>
(Critical Habitat Designated)	
Sei whale	<i>Balaenoptera borealis</i>
Sperm whale	<i>Physeter macrocephalus</i>
Leatherback sea turtle	<i>Dermochelys coriacea</i>
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>
Kemp's Ridley turtle	<i>Lepidochelys kempii</i>
Green turtle	<i>Chelonia mydas</i>
Shortnose sturgeon	<i>Acipenser brevirostrum</i>
Smalltooth sawfish	<i>Pristis pectinata</i>

Note: Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. Atlantic waters.

Threatened

Loggerhead turtle	<i>Caretta caretta</i>
Johnson's seagrass	<i>Halophila johnsonii</i>
(Critical Habitat Designated)	

Proposed Species

None

Proposed Critical Habitat

None

Species Under U.S. Fish and Wildlife Service (USFWS) Jurisdiction:

West Indian manatee (Critical Habitat Designated)	<i>Trichechus manatus</i>
American crocodile (Critical Habitat Designated)	<i>Crocodylus acutus</i>

Candidate Species

Dusky shark	<i>Carcharhinus obscurus</i>
Sand Tiger Shark	<i>Odontaspis taurus</i>
Night Tiger	<i>Cararchahinus signatus</i>
Atlantic sturgeon	<i>Acipenser oxyrhynchus oxyrhynchus</i>
Mangrove rivulus	<i>Rivulus marmoratus</i>
Opposum pipefish	<i>Microphis barchyurus lineatus</i>
Key silverside	<i>Menidia conchorum</i>
Goliath grouper	<i>Epinephelus itajara</i>
Speckled hind	<i>Epinephelus drummondhayi</i>
Warsaw grouper	<i>Epinephelus nigritus</i>
Nassau grouper	<i>Epinephelus striatus</i>
Atlantic White Marlin	<i>Tetrapturus albidus</i>

Candidate species are species for which there is reliable information on their status indicating that a listing under the ESA may be warranted. The candidate species list gives advance notification that specific species may warrant listing in the future. This allows managers to plan management actions that minimize impacts to candidate species and hopefully reduce the likelihood that these actions will later require modification in the event a species is listed. A review of candidate species known to occur in the action area and the potential impacts to these species is not required under Section 7 of the ESA. However, inclusion of candidates in this analysis may stimulate voluntary conservation efforts, which, if effective, may alleviate or eliminate existing threats thus possibly avoiding the need to list them in the future. There are no mandatory federal protections required under the ESA for a candidate species though NOAA Fisheries urges voluntary protection of these species.

Species Descriptions

Allowable gear within the action area, even if the experimental area restrictions are allowed to sunset, is considered unlikely to adversely impact the following listed and candidate species due to their limited geographical range. These species occur primarily or only along the coast or are absent from the principal area of concern: Johnson's seagrass, Shortnose sturgeon, Smalltooth sawfish, American crocodile, the West Indian Manatee, Atlantic sturgeon, Mangrove rivulus, Opposum pipefish and Key silverside. These species will not be included in the following assessment.

Listed Species**Sperm Whale, *Physeter macrocephalus***

Sperm whales are listed as endangered under the Endangered Species Act of 1973, as amended (ESA). They are also protected under the Marine Mammal Protection Act of 1972 (MMPA). The primary reason for this specie's decline was commercial whaling. The International Whaling Commission (IWC) prohibited commercial hunting of sperm whales in 1981 (Reeves and Whitehead 1997 as cited in NMFS 2001a).

For management purposes, the IWC recognizes four stocks of sperm whales: the North Pacific, The North Atlantic, the Northern Indian Ocean and Southern Hemisphere. However, to date, the worldwide stock structure of sperm whales remains unclear (Dufault et al. 1999 as cited in NMFS 2001). In the western North Atlantic, sperm whales range from Greenland to the Gulf of Mexico and the Caribbean. Their occurrence in the waters of the U.S. Atlantic EEZ appears to be seasonal. Based on sighting data, during the winter, concentrations of sperm whales are found east and northeast of Cape Hatteras. In the spring, this concentration shifts northward to east of Delaware and Virginia as well as throughout the central portion of the mid-Atlantic Bight and southern portion of Georges Bank. Their distribution is similar during the summer except sperm whales are also sighted east and north of Georges Bank as well as on the continental shelf south of New England. During the fall, sperm whales continue to be abundant on the continental shelf south of New England and are found along the edge of the continental shelf in the mid-Atlantic Bight (CeTAP 1982; Scott and Sadove 1997). Sperm whales typically prefer deepwater habitats, however, they are periodically found in coastal waters (Scott and Sadove 1997). Their occurrence closer to shore is usually associated with the presence of food. Sperm whales prey primarily on large sized squid but also occasionally take octopus and a variety of fish including shark and skate (Leatherwood and Reeves 1983).

Sperm whales were hunted in America from the 17th century through the early 20th century though specific numbers of animals taken are unknown (Townsend 1935 as cited in NMFS 2001). The IWC has estimated nearly a quarter-million sperm whales were killed worldwide from commercial whaling during the 19th century alone and another 700,000 taken from the early 1900's through the early 1980's (NMFS 2001a and references therein). Since the IWC ban on commercial harvesting of sperm whales, human-induced mortality or injury does not appear to be a significant factor impacting the recovery of the species (Perry et al. 1999 as cited in NMFS 2001a). Due to their more offshore distribution and benthic feeding habits, sperm whales seem less subject to entanglement in fishing gear than some cetacean species. Documented interactions have primarily involved offshore fisheries such as pelagic drift gillnets and longline fisheries. (In January 1999, NMFS issued a Final Rule to prohibit the use of driftnets in the North Atlantic swordfish fishery, 50 CFR Part 630.) Overall, fishery-related mortality or serious injury for the western North Atlantic stock is considered to be less than 10% of the Potential Biological Removal level (PBR). PBR is a calculation required under the MMPA which estimates the number of animals that can be removed annually from the population or stock (in addition to natural mortality) while allowing that stock to remain at an optimum sustainable population level (OSP). The estimated PBR for the western North Atlantic sperm whale is 7.0 (Waring et al. 2002). Other impacts known to kill or injure sperm whales include ship strikes and ingestion of foreign material (i.e., fishing line, plastics).

The best available abundance estimate for sperm whales comes from a combination of two 1998 USA Atlantic surveys giving a combined estimate of 4,702 (CV=0.36), where the estimate from the northern USA Atlantic is 2,848 (CV=0.49) and from the southern USA Atlantic 1,854 (CV=0.53) (Waring et al. 2002). Together, these two surveys are considered to offer the most complete coverage of the species' habitat though the estimates were not corrected for dive-time (average dive-time for sperm whales = 45 minutes) and therefore may represent an underestimate of actual abundance. Currently, the population trend for this species is undeterminable due to insufficient data. The status of the North Atlantic stock relative to OSP in the Atlantic EEZ is unknown.

Blue Whale, *Balaenoptera musculus*

Blue whales are listed as endangered under the ESA of 1973, as amended. They are also protected by the MMPA of 1972. Modern whaling severely depleted the world's stocks of blue whales decreasing their population to only a small fraction of what it was thought to be in the early 20th century. Blue whales were given complete protection in the North Atlantic in 1955 under the International Convention for the Regulation of Whaling though Iceland did not recognize their protected status until 1960 (Sigurjónsson 1988).

Blue whales are the largest of the baleen whales, which instead of teeth, use a series of plates rooted in the upper jaw (made of material similar to that of finger-nails) to strain food from the water. As with most baleen whales, it is thought that blue whales undertake seasonal north/south movements, with summers spent in higher latitudes feeding and winters in lower latitudes, possibly breeding or calving. In the western North Atlantic, blue whales range from the Arctic to the mid-latitudes with only occasional sightings observed in the U.S. Atlantic EEZ during the late summer (CeTAP 1982; Wenzel et al. 1988). Records also exist of this species occurring off Florida and in the Gulf of Mexico though their distribution in southern waters remains largely unknown (Yochem and Leatherwood 1985 as cited Waring et al. 2002). It has generally been accepted that the North Atlantic consists of two stocks of blue whales (western and eastern) however, stock structure has not been examined through molecular or other appropriate analyses. The U.S. Navy has acoustically tracked blue whales in much of the North Atlantic including subtropical waters north of the West Indies and in deep water east of the U.S. EEZ (Clark 1995 as cited in Waring et al. 2002). Evidence from acoustic work has suggested that individual blue whales may range over the entire ocean basin leading some to speculate that they form a single population that breeds at random (NMFS 1998a and references therein). The few population estimates that currently exist for blue whales in the western North Atlantic tend to be specific to particular areas (see NMFS 1998a). Mitchell (1974) estimated the entire western North Atlantic population to number in the low hundreds during the late 1960s and 1970s. It's thought that since their protection from commercial hunting, some populations of blue whales have shown signs of recovery while others have not been monitored to the extent of being able to determine their status. Currently, there is insufficient data to determine population trends for blue whales.

Though commercial whaling has had a severe effect on the status of blue whales worldwide, the western North Atlantic population has not been subjected to legal hunting since the 1960s. Today, potential threats are more likely to occur from collisions with vessels, entanglement in fishing gear and habitat degradation in the forms of both noise and chemical pollution. Currently, there are no confirmed records of mortalities or serious injuries from fishery interactions occurring in the U.S. Atlantic EEZ. It is unclear as to whether blue whales are just less prone to becoming entangled or if their large size allows them to break through nets or carry gear away with them. If the latter is the case, there may be undiscovered mortalities resulting from gear-related injuries. The total level of human-caused mortality and serious injury is unknown but believed to be insignificant (Waring et al. 2002). Due to lack of data on current minimum population size, no PBR estimate can be calculated for the western North Atlantic stock of blue whales. A recovery plan for blue whales was published in 1998 and is in effect (NMFS 1998a).

Fin whale, *Balaenoptera physalus*

Fin whales are listed as endangered under the ESA of 1973, as amended. They are also protected under the MMPA of 1972. Modern whaling depleted most stocks of fin whales. Commercial

hunting in the North Atlantic ended in 1987 though Greenland still conducts an “aboriginal subsistence” hunt allowed under the IWC.

The overall distribution pattern of fin whales is complex. Fin whales are known to occur from the Gulf of Mexico northward to the arctic pack ice (NMFS 1998b and references therein). They appear to display a less obvious north/south pattern of migration exhibited by other baleen whales. Based on acoustic studies, a general southward “flow pattern” from the Labrador/Newfoundland region south past Bermuda and into the West Indies occurs in the fall (Clark 1995 as cited in NMFS 1998b). They are common in waters of the U.S. Atlantic EEZ primarily from Cape Hatteras northward (Waring et al. 2002). Regional distribution of fin whales is most likely influenced by prey availability with krill and small schooling fish such as capelin, *Mallotus villosus*, herring, *Clupea harengus*, and sand lance, *Ammodytes* spp., believed to be their main prey items (NMFS 1998b and references therein).

For management purposes, NOAA Fisheries recognizes only a single stock of fin whales in the U.S. waters of the western North Atlantic, though genetic data support the idea of several subpopulations (Bérubé et al. 1998). A survey conducted in 1999 from Georges Bank northward to the Gulf of St. Lawrence, led to an estimate of 2,814 (CV=0.21) individuals for the western North Atlantic population. This however, is considered a conservative estimate due to the extensive range of the fin whale throughout the entire North Atlantic and the uncertainties regarding population structure and exchange between surveyed and non-surveyed areas. To date, there is insufficient information in order to determine population trends.

Aside from the threat of illegal whaling or increased legal whaling, potential threats affecting fin whales include collisions with vessels, entanglement in fishing gear and habitat degradation from chemical and noise pollution. Fin whales are known to have been killed or seriously injured by inshore fishing gear (gillnets and lobster lines) off eastern Canada and the United States (NMFS 1998b). The status of the western North Atlantic stock relative to OSP in the U.S. Atlantic EEZ is unknown. The total level of human-caused mortality or serious injury is also unknown, but is considered to be less than 10% of the calculated PBR (4.7) and thus not significant (Waring et al. 2002). A draft recovery plan for fin whales is available but the plan has not yet been finalized (NMFS 1998b).

Sei whale, *Balaenoptera borealis*

Sei whales are listed as endangered under the ESA of 1973, as amended. They are also protected under the MMPA of 1972. Sei whales began to be regularly hunted by modern whalers after the populations of larger, more easily taken species (i.e., humpbacks, right whales and gray whales, *Eschrichtius robustus*) had declined. Most stocks of sei whales were also reduced, in some cases drastically, by whaling efforts throughout the 1950’s into the early 1970’s. International protection for the sei whale began in the 1970’s though populations in the North Atlantic continued to be harvested by Iceland until 1986 when the IWC’s moratorium on commercial hunting in the Northern Hemisphere came into effect.

The sei whale is one of the least well studied of the “great whales”. Hence little is known about the distribution and current status for most stocks. They are believed to undertake seasonal north/south movements, with summers spent in higher latitudes feeding and winters in lower latitudes. In the western North Atlantic, it is thought that a large segment of the population is centered in northerly waters, perhaps the Scotian Shelf during the summer feeding season

(Mitchell and Chapman 1977 as cited in Waring et al. 2002). Their southern range during the spring and summer includes the northern areas of the U.S. Atlantic EEZ (i.e., Gulf of Maine and Georges Bank). Strandings along the northern Gulf of Mexico and in the Greater Antilles, indicate those areas to be the southernmost range for this population (Mead 1977 as cited in Waring et al. 1999). The sei whale is generally found in deeper waters though they are known for periodic excursions into more shallow and inshore waters when food is abundant (Payne et al. 1990). Their primary food are calanoid copepods and euphausiids (NMFS 1998b and references therein).

Sei whales are not known to be common anywhere in U. S. Atlantic waters (NMFS 1998a). Stock identification in the western North Atlantic remains unclear however, there is some evidence of two stocks consisting of a Nova Scotia stock and a Labrador Sea stock (Mitchell and Chapman 1977 as cited in Waring et al. 1999). The Nova Scotia stock is thought to extend along the U. S. coast to at least North Carolina. The total number of sei whales in the U. S. Atlantic EEZ is not known and there are no recent abundance estimates.

Since the cessation of commercial whaling, threats to sei whales in the western North Atlantic appear to be few although they do include ship collisions and entanglement in fishing gear. Because of their offshore distribution and overall scarcity in U. S. Atlantic waters, reports of entrapments and entanglements tend to be low. It is unknown whether sei whales are less prone to interact with fishing gear or if they break through or carry the gear away with them causing mortalities that go largely unrecorded. There were no reported fishery-related mortalities or serious injuries observed by NOAA Fisheries during 1994-1998 (Waring et al. 2002). The total level of human-caused impacts on sei whales is unknown but due to the rarity of mortality reports it is thought to be insignificant (Waring et al. 2002). The status of the Nova Scotia stock relative to OSP in the Atlantic EEZ is unknown. PBR for this stock is also unknown since there is no minimum estimate of population size however, any fishery-related mortality would be unlawful as there is no recovery plan currently in place (NMFS 1998a).

Humpback whale, *Megaptera noveangliae*

Humpback whales are listed as endangered under the ESA of 1973, as amended. They are also protected under the MMPA of 1972. Because of their nature to aggregate near coasts on both summer and winter grounds, humpbacks were relatively easy prey for shore-based whalers. As a result, their populations were severely depleted by the time they achieved protection from commercial hunting in 1966.

Humpback whales utilize the western North Atlantic as a feeding ground during the spring and summer. Their range encompasses the eastern coast of the United States (including the Gulf of Maine), the Gulf of St. Lawrence, Newfoundland/Labrador and western Greenland (Katona and Beard 1990). Other North Atlantic feeding grounds are found off Iceland and northern Norway (Christensen et al. 1992; Palsbøll et al. 1997). It is believed that that these six regions represent relatively discrete subpopulations which are matrilineally determined (Waring et al. 2002 and reference therein). During the fall, most humpback whales will migrate to calving and breeding areas found in lower latitudes (Clapham et al. 1993; Katona and Beard 1990). A number of animals, however, are observed remaining in mid and high-latitude regions during the winter (Swingle et al. 1993). Based on sighting and stranding information, it appears that young humpbacks in particular have increased in occurrence along the coasts of Virginia and North Carolina during the winter (Wiley et al. 1995). Wiley et al. (1995), concluded that areas off the

Virginia and North Carolina coast are important habitat for juvenile humpback whales and that anthropogenic (human induced) factors may negatively impact whales in this area. There have also been increased wintertime sightings off the coastal waters further to the southeast (Waring et al. 2002 and references therein).

It is presently unknown whether these increased sightings are due to a distributional change, or represent an increase in sighting effort and/or whale abundance. In order to determine the population identity of humpbacks over-wintering in the southeast and mid-Atlantic areas, a study by Barco et al. (2001) compared photographs of 40 living and dead whales observed in the southeastern and mid-Atlantic region to cataloged photographs collected from other areas of the North Atlantic. Matches linked individuals to the Gulf of Maine, Newfoundland and the Gulf of St. Lawrence feeding areas.

Photographic mark-recapture analyses from the Years of the North Atlantic Humpback (YONAH) project conducted in 1992/1993, gave an ocean-basin-wide estimate of 11,570 individuals ($CV=0.069$), which to date is regarded as the best available estimate for the North Atlantic (Waring et al. 2002). However, because the YONAH sampling was not spatially representative in the feeding grounds, this estimate is considered negatively biased. It appears that the humpback whale population is increasing though it is unclear whether this increase is ocean-wide or confined to specific feeding grounds.

Humpback whales are described as opportunistic feeders, foraging on a variety of food items including euphausiids and small schooling fish such as herring, sand lance and mackerel (Paquet et al. 1997; Payne et al. 1990). In the mid-latitudes during the winter, juvenile humpbacks are also known to eat bay anchovies and menhaden, *Brevoortia tyrannus* (Wiley et al. 1995).

Although habitat degradation, such as chemical and noise pollution, may be adversely affecting the recovery of humpbacks, the major threats appear to be vessel collisions and entanglements with fishing gear (Waring et al. 2002 for synopsis of mortality/injury). Wiley et al. (1995) examining stranding data obtained principally from the mid-Atlantic, found that in the 20 cases where evidence of human impact was discernable, 30% had major injuries possibly caused by a vessel collision and 25% had injuries consistent with entanglement in fishing gear.

There are insufficient data to reliably establish population trends for humpback whales in the North Atlantic, overall. The total level of human-caused mortality or serious injury for the Gulf of Maine (formerly the western North Atlantic stock) stock is not less than 10% of the calculated PBR (1.3) and therefore cannot be considered to be insignificant (Waring et al. 2002). The high mortality of humpbacks off the mid-Atlantic states (52 mortalities recorded between 1990 and 2000) is of concern as some of these animals are known to be from the Gulf of Maine population. A recovery plan was published in 1991 and is in effect (NMFS 1991b).

Northern right whale, *Eubalaena glacialis*

Northern right whales are listed as endangered under the ESA of 1973, as amended. They are also protected under the MMPA of 1972. Over hunting is the major reason the western North Atlantic right whale population has declined to less than 300 individuals. Currently, the North Atlantic right whale is considered one of the most critically endangered populations of large whales in the world (Clapham et al. 1999). The species was continually hunted off the east coast of the United States for three centuries possibly reducing its numbers to less than 100 individuals

by the time international protection from the League of Nations came into effect in 1935 (Waring et al. 2001 and reference therein). Right whales have been protected from commercial whaling under legislation of the IWC since 1949 (NMFS 1991a).

Western North Atlantic right whales occur in the waters off New England and northward to the Bay of Fundy and the Scotian Shelf during the summer (Waring et al. 2002). During the winter, a segment of the population, consisting mainly of pregnant females, migrates southward to calving grounds off the coastal waters of the southeastern United States. Right whales use mid-Atlantic waters as a migratory pathway between their summer feeding grounds and winter calving grounds. During the winters of 1999/2000 and 2000/2001, considerable numbers of right whales were recorded in the Charleston, South Carolina area (NMFS 2001b). Currently, it remains unclear whether this is typical or reflects a northern expansion of the normal winter range.

Based on photo-identification techniques, the western North Atlantic population size was estimated to be 291 individuals in 1998 (Kraus et al. 2000 as cited in Waring et al. 2002). This estimate may be low if animals were not photographed and identified or if animals were incorrectly presumed dead due to not being seen for an extended period of time. The population growth rate estimated for the western North Atlantic population during the late 1980's through early 1990's suggested that the stock was slowly recovering (Knowlton et al. 1994). However, a review by the IWC of work conducted on the status and trends of the right whale population indicated that the survival rate of the northern right whale had declined during the 1990's (Waring et al. 2002 and references therein). One factor currently under review for this decline is the apparent increase in the calving interval. The mean calving interval pre-1992 was estimated at 3.67 years. An updated analysis considering data through the 1997/98 season indicated that the mean calving interval had increased to more than 5 years (Kraus et al. 2000 as cited in Waring et al. 2002). Reasons under consideration for this shift include contaminants, biotoxins, nutrition/food limitation, disease and inbreeding problems.

The primary sources of human-caused mortality and injury of right whales include ship strikes and entanglement in fishing gear. Hamilton et al. (1998) estimated that 62% of right whales show injuries consistent with entanglement in gear while 6% exhibited signs of injury from vessel strikes. A subsequent study by Knowlton et al. (2001) reported that the frequency of right whale entanglements has been on an upward trend. The current estimate of the right whale population having been entangled is now 72%. With the small population size and low annual reproductive rate, human-caused mortalities have a greater impact on this species relative to other species. As such, due to the overall decline in the western North Atlantic right whale population, the PBR is set at zero (Waring et al. 2002).

Three right whale critical habitats were designated by NMFS [59 FR 28793; June 3, 1994]. Two are off New England, Cape Cod/Massachusetts Bay and Great South Channel. The third is off the southeastern coast of the United States (between 31°15' N. latitude (approximately the mouth of the Altamaha River, Georgia) and 30°15' N. latitude (approximately Jacksonville Beach, Florida) extending from the coast out to 15 nautical miles offshore and the coastal waters between 30°15' N. latitude and 28°00' N. (approximately Sebastian Inlet, Florida) from the coast out to 5 miles). Programs to foster both awareness and mitigate potential problems of anthropogenic injury and mortality to right whales have been implemented in both the northeast and southeast areas. One such program is the Mandatory Ship Reporting System requiring vessels over 300 tons to report information on their location, speed and direction once in a

critical habitat. In return they receive information on right whale occurrence and recommendations on measures to avoid collisions with whales. A recovery plan was published in 1991 by NMFS and is in effect (NMFS 1991b). A revised plan is currently under review.

Kemp's ridley turtle, *Lepidochelys kempii*

Kemp's ridley turtles are listed as endangered under the ESA of 1973, as amended. Their population has declined since 1947 with the primary cause being attributed to human activities such as egg collection, the harvesting of juveniles and adults for meat consumption and other products. In addition, Kemp's ridleys have been adversely impacted by high levels of incidental capture by shrimp trawlers (NMFS 2001b). Of all the species of marine turtles, this species has declined to the lowest population level.

Kemp's ridleys occur mainly in coastal areas of the Gulf of Mexico and along the east coast of the U.S. with sightings extending as far north as Cape Cod Bay, Massachusetts (NMFS 2001c). Post-hatchlings appear to inhabit pelagic waters of the Gulf and North Atlantic Ocean where they feed on *Sargassum* and associated fauna. After one or two years, ridleys then move into shallow, nearshore waters and forage primarily on crabs. Their principal nesting beaches are found in Mexico though a few nest each year in south Texas. The nearshore waters of the Gulf and Atlantic provide important habitat for juveniles. Preliminary analysis of tagging studies conducted by Texas A&M University, suggests that subadult ridleys remain in warm, shallow, nearshore waters in the northern Gulf until cooler waters push them offshore or south along the Florida coast (NMFS 2001a). Sexual maturity is thought to occur between 7-15 years indicating that this species is probably long lived.

In 1995, NOAA Fisheries established the Turtle Expert Working Group (TEWG) consisting of population biologists, sea turtles scientists and managers. Charged with conducting an assessment of the Kemp's ridley population, the group suggested that the population was in the early stages of recovery, though strandings in some years have increased at rates higher than the estimated rate of population increase (TEWG 1998 as cited in NMFS 2001a). Of particular concern was the relatively high numbers of Kemp's ridley carcasses occurring on Texas and Louisiana beaches in recent years. These strandings tended to occur during periods of high levels of shrimping and are believed to have been incidentally taken by the shrimp fishery though other sources of mortality for this species exists in these waters. Overall, the TEWG indicates that the population appears to be increasing through the efforts of nest protection programs implemented by both the USFWS and Mexico's Instituto Nacional de Pesca coupled with the use of Turtle Excluder Devices (TEDs) by the shrimp fishery.

Even though the recovery of this population appears to have begun, caution is still necessary due to a variety of factors. Major threats still exist in the form of incidental capture in both commercial and recreational fisheries. Fishing gear known to have captured turtles includes bottom trawls, gillnets, longline, pound nets, traps/pots used to harvest crabs, whelk, lobster and reef fish, dredge and hook and line (NMFS 2001c). Ingestion of marine debris, dredging and coastal construction, beach development and artificial lighting on nesting beaches are also known to negatively impact turtles. In the Gulf of Mexico, oil spills are also a concern. To further the recovery of the Kemp's ridley turtle population, NOAA Fisheries joined the cooperative conservation effort at Rancho Nuevo in 1996 whose objective is to protect area nesting females, ensure high hatchling production and facilitate research efforts. Moreover, NOAA Fisheries has implemented regulations to help reduce incidental capture in the shrimp

and summer flounder trawl fisheries, longline fisheries, pound net fishery in Chesapeake Bay, Virginia and gillnet fisheries in Pamlico Sound, North Carolina. A recovery plan is in effect for the Kemp's ridley turtle (USFWS and NMFS 1992)

Hawksbill turtle, *Eretmochelys imbricata*

Hawksbill turtles are listed as endangered under the ESA of 1973, as amended. Most populations appear to be declining (as much as 80% during the last 100 years) or depleted (Meylan 2001).

Hawksbill turtles occur in tropical and subtropical seas in the Atlantic, Pacific and Indian Oceans. They are widely distributed throughout the Caribbean Sea and western North Atlantic with sightings occasionally occurring as far north as Massachusetts. Hawksbills utilize different habitats during various stages of their life cycle (NMFS 2001d). Post-hatchlings inhabit the pelagic environment, using weedlines that accumulate at convergence points as shelter. After several years at sea, hawksbills head toward coastal waters. Coral reefs are considered the resident foraging habitat for juveniles, sub-adults and adults as they feed primarily on sponges. Ledges and caves are used for resting. Nesting tends to occur on small pocket beaches. A single female may nest three to five times each season with clutch sizes of up to 250 eggs (Meylan 2001). Females exhibit a high degree of fidelity to their nest sites and genetic studies suggest that nesting populations be treated as separate stocks whereas feeding grounds typically include turtles from multiple nesting populations (Meylan 2001). The age at which hawksbills attain sexual maturity is unknown however, they are slow growing indicating it occurs at a later age.

The following distributional information is from Meylan (2001). The Atlantic coast of Florida is the only area in the U.S. where hawksbill turtles nest on a regular basis, however, four nests have been the maximum counted in any year from 1979-2000. Strandings occur along the entire Atlantic coast although the majorities are found south of Cape Canaveral. Most strandings involve pelagic-staged turtles that are perhaps dispersing from nesting beaches in the Gulf and Caribbean. Juvenile and adults are also observed along Florida's Atlantic coast but not in large numbers.

Most hawksbill turtles in U. S. waters occur in Puerto Rico and the U.S. Virgin Islands (U.S.V.I.). Mona Island, Puerto Rico has the largest known nesting aggregation in the Caribbean Basin with over 500 nests recorded annually during 1997-2000. As such, Mona Island has been designated as a critical habitat for hawksbill turtles and is protected under the administration of the Puerto Rico Department of Natural Resources and Environment. Nesting also occurs in other areas in Puerto Rico though many sites have not been systematically surveyed over a significant period of time. In the U.S.V.I., important nesting sites occur as well. A small, but seemingly static, nesting population has been surveyed since 1987 at Buck Island Reef National Monument off St. Croix. Nesting is also observed elsewhere on St. Croix and the Islands of St. John and St. Thomas. Juvenile and adult hawksbills are commonly found in the waters of the U.S.V.I.. Tagging studies have indicated that immature turtles remain resident in these waters for extended periods.

Primary threats to the hawksbill turtle populations along the Atlantic coast include fouling from petroleum products, ingestion of marine debris, loss or degradation of habitat (i. e. beach development and artificial lighting on nesting beaches), boat strikes and entanglement in fishing gear or other marine debris. In the Gulf, marine pollution (particularly oil) as well as entanglement, habitat loss and boat-related injuries are also issues. The Caribbean populations

face similar threats along with incidences of poaching and illegal trade for tortoiseshell and stuffed juvenile hawksbills (NMFS 2001c).

Regulations are in effect to help reduce incidental capture in the shrimp and summer flounder trawl fisheries, longline fisheries, pound net fishery in Chesapeake Bay, Virginia and gillnet fisheries in Pamlico Sound, North Carolina. A recovery plan is in effect (NMFS and USFWS 1993).

Green turtle, *Chelonia mydas*

Green turtles are listed as threatened under the ESA of 1973, as amended, throughout their range except for the Florida and Pacific Mexico breeding populations, which are listed as endangered. The greatest cause of this species' decline is attributed to commercial harvest for food as well as products such as jewelry. Incidental catches in commercial shrimp trawlers are also considered to have had an adverse effect of its recovery.

Green turtles are observed in waters extending from Texas to Massachusetts as well as around the U.S.V.I. and Puerto Rico (NMFS 2001c). Important feeding grounds have been identified off both the southwest and southeast coastlines of Florida as well as the Florida Keys. The eastern coast of Florida is also thought to contain primary nesting sites (Ehrhart 1979 as cited in NMFS 2001a). Additional nesting sites are found in the U.S.V.I., Puerto Rico, South and North Carolina. Hatchlings inhabit the pelagic environment where they are believed to associate with communities of *Sargassum*. After several years, the turtles head to coastal habitats where they forage on sea grasses and other macroalgae in shallow bays, lagoons and reefs (Rebel 1974 as cited in NMFS 2001a).

Green turtles are slow growing and delay sexual maturity until approximately 25-60 years of age (NMFS 2001c). Their total population size is unknown and determining population trends is difficult due to wide year-to-year fluctuations in numbers of nesting females. Current estimates of females nesting annually on Florida are approximately 700 on average (NMFS 2001c). According to data from Florida's Index Nesting Beach Survey Program, which began in 1989, green turtle nesting in Florida for the last 10-year period of the study appears to be stable or increasing (Witherington and Koepfel 1999).

Major threats affecting this species are similar to threats faced by other marine turtle species and include incidental capture in both commercial and recreational fisheries, ingestion of marine debris, artificial lighting on nesting beaches and coastal development or habitat loss. As with other species, NOAA Fisheries has implemented regulations to help reduce incidental capture in the shrimp and summer flounder trawl fisheries, longline fisheries, pound net fishery in Chesapeake Bay, Virginia and gillnet fisheries in Pamlico Sound, North Carolina. In the Caribbean, the coastal waters of Culebra Island, Puerto Rico were designated as critical habitat in 1998. NOAA Fisheries and USFWS have published a recovery plan for the green turtle, which is in effect (NMFS and USFWS 1991a).

Loggerhead turtle, *Caretta caretta*

Loggerhead turtles were listed as threatened under the ESA of 1973, as amended in July of 1978. Loggerheads are found in bays, estuaries, lagoons and along continental shelves in temperate, subtropical and tropical waters of the Atlantic, Pacific and Indian Oceans. In the Atlantic, their range includes waters from Newfoundland southward to Argentina. They are considered the most abundant species of sea turtle occurring off U.S. Atlantic shores.

Loggerhead turtles attain sexual maturity between the ages of 20 and 38 (NMFS 2001c). Females reproduce approximately every 2.5 years and eggs are laid throughout the summer (Richardson and Richardson 1982 as cited in NMFS SEFSC 2001). The largest known nesting concentrations in the U.S. are along the east coast of Florida. Additional nesting sites occur in Georgia, the Carolinas and the Gulf Coast of Florida. Five nesting subpopulations have been identified in the western North Atlantic through genetic analyses (NMFS 2001c). A northern subpopulation occurs from North Carolina to northeast Florida. South Florida has a second nesting subpopulation in the Florida Panhandle. A third and a fourth occurs on the eastern Yucatán Peninsula. The fifth nesting subpopulation occurs on the islands of the Dry Tortugas near Key West, Florida. Each nesting assemblage is considered a distinct reproductive population. Nesting trends are available for the northern and south Florida subpopulations. Nesting females in Georgia and the Carolinas appear to be stable at best if not declining while numbers for south Florida are thought to be stable or increasing though the most recent evidence indicates that their rate of increase may be slowing (NMFS SEFSC 2001). These trends are of adult nesting females and may not reflect growth rates for the overall population.

The sex of loggerhead hatchlings is environmentally determined by the temperature of the nest during incubation (NMFS SEFSC 2001). In general, warmer temperatures, as found in nesting sites near Cape Canaveral, Florida, produce more females whereas the cooler temperatures affecting nesting sites in the northern subpopulation produce predominantly males. Since males appear not to exhibit the same degree of site fidelity as nesting females, it is thought that the high proportion of males produced in the northern subpopulation is an important source of males throughout the southeast U.S., making that small subpopulation very important with regard to management decisions.

In the Atlantic, hatchlings head directly offshore and are found associating with *Sargassum* in pelagic driftlines (NMFS 2001c). Loggerheads spend 7-13 years in the pelagic environment until reaching a size of approximately 41-51 cm (16-20 in) when they move to near-shore and estuarine waters. Once inshore, they live in benthic habitats where they feed primarily on invertebrates. Their foraging grounds contain individuals from various nesting colonies from throughout the western North Atlantic (TEWG 2000 as cited in NMFS SEFSC 2001).

One primary threat to the loggerhead population is incidental capture in fishing gear. Gear known to impact this species includes trawl, gill nets, longline, hook-and-line, pound nets, long haul seine, channel nets and lobster pots. Conservation efforts on both the state and federal levels have been helpful in mitigating fishery and sea turtle interactions. The requirement to use TEDs by commercial shrimpers in the U.S. Atlantic and Gulf of Mexico, has reduced the mortality of this species in that fishery. Concerns remain as evidence suggested that large subadults and adults were not able to escape through the openings of all TEDs authorized for use. As such, NOAA Fisheries has recently implemented regulations modifying the size of the escape opening

on TEDs used by shrimp trawlers operating in the southeastern U.S to allow for larger, benthic immature and adult loggerheads to escape [FR Vol. 68, No. 35, February 2003].

On the state level, Georgia now requires the use of TEDs in their whelk trawl fishery in state waters and almost all gillnetting in state waters of South Carolina, Georgia, Florida, Louisiana and Texas is prohibited. Entanglement nets are also prohibited in most fisheries managed by the South Atlantic Council. Other management actions have been implemented by NOAA Fisheries to help reduce incidental takes in pelagic longline fisheries, the pound net fishery in Chesapeake Bay, Virginia and gillnet fisheries in Pamlico Sound, North Carolina.

Other factors adversely impacting this species include habitat degradation, particularly of nesting habitats as well as ingestion of marine debris and biotoxins. NOAA Fisheries and USFWS (NMFS and USFWS 1991b) published a recovery plan for the loggerhead, which is in the process of being revised [FR Vol. 68, No. 54, March 20, 2003].

Leatherback turtle, *Dermochelys coriacea*

Leatherback turtles were listed as endangered throughout their range in June of 1970 under the ESA of 1973, as amended.

Leatherbacks are largely pelagic inhabiting the open ocean as hatchlings and remaining there through adulthood. They do, however, move into coastal waters to feed and reproduce. In the Atlantic Ocean, leatherbacks have been observed as far north as Labrador, Canada and as far south as Argentina and South Africa (NMFS SEFSC 2001 and references therein). Pelagic coelentrates are their major prey items and the movements of leatherbacks appear to be closely associated with their search for food.

Aerial surveys conducted along the western North Atlantic have provided information regarding the seasonal movements of leatherbacks. Large juveniles and adults from the southeastern coast appear to move to the mid-Atlantic in the spring with some individuals continuing further north up to Canadian waters in the summer. During the fall and winter, leatherbacks travel southward or perhaps farther offshore. Movements of smaller juvenile leatherbacks remain unclear, as aerial surveys are limited to observations of larger individuals.

Little is known about the population structure of leatherbacks. The sex ratio for leatherbacks appears to vary with location, season and year (Leslie et al. 1996 as cited in NMFS SEFSC 2001). Males tend to be produced more during wetter, cooler months while females tend to be produced during drier, warmer months. Estimates of the population are done through surveys of nesting females. Despite being a long-lived species, generally living over 30 years, female leatherbacks, in some cases, are thought to attain sexual maturity as early as 3-6 years to 13-14 years (Rhodin 1985; Zug and Porham 1996 as cited in NMFS 2001a). They nest approximately every 2-3 years producing 100 or more eggs per clutch. Three primary nesting beaches are known to occur in the U.S.: St. Croix, U.S.V.I., Culebra Island, Puerto Rico and along the southeast Florida coast (NMFS 2001c). Nesting females have increased from 20 per year to over 100 in St. Croix (NMFS 2001c). Increases have also been recorded in Florida and Puerto Rico, however, overall nesting populations worldwide have declined (NMFS SEFSC 2001).

In 1978, the USFWS established a critical habitat for this species in the U.S.V.I. at Sandy Point, St. Croix. A year later, NOAA Fisheries extended this designation to include the waters around Sandy Point (Bell and Spotila 2001 as cited in NMFS SEFSC 2001).

As with loggerhead turtles, a variety of fisheries use gear that impact leatherbacks. Gillnets, longlines, trawls and pot gear are of the most concern. Recently, NOAA Fisheries has implemented regulations modifying the size of the escape opening on TEDs used by shrimp trawlers operating in the southeastern U.S to allow leatherbacks to escape as previously allowed. TED openings were not capable of excluding adult leatherbacks [FR Vol. 68, No. 35. February 2003]. This final rule eliminates the unplanned, temporary activities implemented under the leatherback conservation zone regulations which stipulated using weekly aerial surveys to assess turtle concentrations along the coast from Cape Canaveral, Florida to the North Carolina/Virginia border. Under the leatherback conservation zone regulations, if concentrations were high (10 turtles/50 nm), then the area was closed to shrimp trawlers not using TEDs modified with the leatherback escape opening. NOAA Fisheries can impose emergency measures to further protect the turtles when warranted. In addition, many of the state fishery conservation efforts in place to reduce incidental capture of other sea turtles have also benefited the leatherback. Other factors impacting this species include illegal harvesting of nesting females and/or their eggs, destruction of nesting habitat and ingesting marine debris. In 1992, NMFS and USFWS published a recovery plan for leatherback turtles (NMFS and USFWS 1992).

Candidate Species

Dusky shark, *Carcharhinus obscurus*

This species has a wide-ranging, though patchy, distribution. It is a cosmopolitan species that occurs along continental coastlines and temperate waters, ranging from the surf-zone to well offshore. Off the eastern Atlantic coast of the United States, its distribution extends from southern New England to the Caribbean. A long-lived species and slow to sexually mature, the dusky shark is highly migratory. It undertakes seasonal migrations traveling northward during the summer and back south in the fall. Major nursery areas have been identified off New Jersey to South Carolina. The young occur in shallow, nearshore waters.

Generally bottom feeders, dusky sharks can be found at the surface to depths of 400 m (1,240 ft). Foraging on a wide array of bony and cartilaginous fish, prey items for larger individuals include groupers and jacks. As a common apex predator, the dusky shark plays an important, but poorly studied, role in the marine ecosystem. Currently, the principal threats identified for this species are commercial fisheries, specifically longline and gillnet fisheries targeting sharks, and recreational fisheries taking sharks. Off North America, the proportion of dusky sharks caught has been decreasing though dusky sharks are still taken as bycatch in other fisheries such as the directed tuna and swordfish longline fisheries. It is feared that the continued fishing for more abundant species could further deplete this species.

Recent reviews of catch and landings data for large coastal sharks in the western Atlantic reported that by the mid-1980's the abundance of many of these sharks had declined by 50 to 75% from levels reported in the 1970's. Despite the apparent decrease in large coastal shark species, an expansion of the fishery occurred in the late 1980's due to the increased demand for shark fins. On a global scale, dusky shark populations are considered at risk. A continued decline in catch rates in the western North Atlantic has prompted a ban on harvesting this species by U.S. commercial fishermen. A recent assessment of fish stocks considered at risk was conducted by the American Fisheries Society and found dusky shark populations in the western Atlantic to be vulnerable (not endangered or threatened severely but at possible risk of falling into one of

these categories in the near future). The dusky shark was added to the candidate species list in 1997 and is currently managed under NOAA Fisheries Highly Migratory Species FMP.

Information provided by :

http://www.nmfs.noaa.gov/prot_res/species/fish/dusky_shark.html and

<http://www.flmnh.ufl.edu>.

Sand tiger shark , *Odontaspis taurus*

Sand tiger sharks have a broad inshore distribution. They are often observed hovering motionless just above the seabed in or near deep sandy-bottomed gutters or rocky caves, or by inshore rocky reefs and islands. They are generally coastal, usually found from the surf zone down to depths around 23 m (75 ft). They are also found in shallow bays, around coral reefs and to depths of 183 m (600 ft) on the continental shelf. Off the eastern coast of the U.S., they range from the Gulf of Maine to Florida.

Sand tiger sharks have been harvested throughout their range and can be vulnerable to fisheries since they aggregate in large numbers at particular coastal sites at certain times of the year. They are primarily caught with line gear but are also taken in demersal gillnets and with pelagic and bottom trawls. Coastal pollution also threatens this species. Currently, the sand tiger shark is managed under NOAA Fisheries Highly Migratory FMP which gives the shark full protection from being harvested off the Atlantic coast of the U.S.. The Atlantic and Gulf of Mexico populations of this species were added to the candidate species list in 1997.

Information provided by: http://www.nmfs.noaa.gov/prot_res/species/fish/sandtiger_shark.html.

Night shark, *Carcharhinus signatus*

Minimal information exists on the night shark as it inhabits deepwater. Thus, most of the available data on this species are fisheries related. In the western Atlantic, night sharks are known to occur from Delaware south to Brazil including the Gulf of Mexico. They were once considered very abundant in deepwaters off the northern coast of Cuba and the Straits of Florida. A tropical species, this shark is rarely found in cooler waters. It is usually found at depths greater than 150 to 200 fathoms (274 to 366 m) during the day and rising to 100 fathoms (183 m) at night. It is also observed at the surface indicating it commonly engages in vertical migrations. Primary prey items for this species include fish such as butterfishes, sea basses, scombrids as well as squid and shrimp.

A variety of scientific and anecdotal reports have indicated that this species has been nearly depleted from the southeastern coast of the United States. Commercial longline fishermen have indicated that it was not uncommon to catch 50 to 80 night sharks in every set from Florida up through the Carolinas in the late 1970's. Sport fishermen as well were known to land a night shark daily around the Miami area during the 1970's. Though now considered rare in U.S. waters, logbook data from the pelagic longline fleet indicate they are still being caught. The night shark was added to the candidate species list in 1997. Currently, the night shark is one of several shark species prohibited from being harvested under NOAA Fisheries Highly Migratory Species FMP.

Information provided by:

http://www.nmfs.noaa.gov/prot_res/species/fish/night_shark.html and

<http://www.fao.org>

Speckled hind, *Epinephelus drummondhayi*

Speckled hind inhabit warm, moderately deep waters from North Carolina to Cuba including the Gulf of Mexico, Bermuda and the Bahamas. Their preferred habitat is hard bottom reefs in depths ranging from 27 to 122 m (88 to 400 ft). Speckled hind are protogynous hermaphrodites. They begin life as females and, as they mature, become males. Thus, most of the larger, older fish are males. Spawning is believed to occur offshore July through September. Their diet includes fish, shrimp, crabs, squid and octopus. Mortality from fishing is considered the major threat to this species which has been designated as “overfished” as defined by the Magnuson-Stevens Fishery Conservation and Management Act of 1996 (MSFCMA). The South Atlantic Council’s Snapper Grouper FMP currently restricts the number of speckled hind landed to 1 fish per vessel per trip; sale is prohibited. Speckled hind was listed as a candidate species in 1997. Information provided by:

http://www.nmfs.noaa.gov/prot_res/species/fish/speckled_hind.html and
SAFMC Habitat Plan for the South Atlantic Region (1998)

Goliath grouper, *Epinephelus itajara*

Off the U.S. Atlantic, Goliath groupers range from North Carolina southward to the Gulf of Mexico. Off Florida, the species is most abundant on the east coast and in the Florida Keys. Goliath groupers are long-lived and can attain sizes upward of 260 kg (700 lbs). Adult and juveniles inhabit shallow waters and reside around bottom features that provide both cover and protection (e.g., shipwrecks, reefs, ledges, piers, bridges and mangrove-lined shores). Adults appear to occupy limited home-ranges with little inter-reef movement. Adults are also found around high-relief ledges and wrecks further offshore, particularly during the spawning season, where they have been caught in areas greater than 22 km (12 nm) offshore. Spawning occurs at aggregation sites from July through September during the full moon. Off southwestern Florida, individuals have been known to move up to 100 km (54 nm) from inshore reefs to offshore spawning sites. In the past, spawning aggregations have been observed off Palm Beach, Florida but are believed to no longer occur in that area. Large numbers of this species, however, have been reported as aggregating around isolated reefs, rock ledges and wrecks in depths of 46 m (150 ft) or less on the southwest and southeast Florida shelf during spawning season. Currently, there is no conclusive evidence regarding their reproductive patterns, however, it has been suggested that this species may be protogynous hermaphroditic.

Habitat preferences of this species makes them easily accessible to fishermen, especially spearfishermen. Known prey items include fish, turtle hatchlings, crabs, slipper lobsters and, frequently, spiny lobsters. Occurrences of Goliath groupers are rare north of Florida, though the States of Georgia and South Carolina requested that Goliath groupers be protected within Specials Management Zones around their artificial reefs. Mortality from heavy fishing pressure on spawning aggregations is considered a major threat to this species, which has been designated as “overfished” as defined by the MSFCMA of 1996. Currently, the South Atlantic Council’s Snapper Grouper FMP prohibits the harvest or possession of this species in the South Atlantic Economic Exclusive Zone (EEZ). Harvest is also prohibited in the Gulf of Mexico and in Florida. The regulation prohibiting harvest of Goliath grouper in the South Atlantic became effective November 2, 1990. Goliath groupers have been listed as a candidate species since 1991. Information provided by:

http://www.nmfs.noaa.gov/prot_res/species/fish/goliath_grouper.html and
SAFMC Habitat Plan for the South Atlantic Region (1998)

Warsaw grouper, *Epinephelus nigritus*

Warsaw groupers range from North Carolina to the Florida Keys and throughout much of the Caribbean and the Gulf of Mexico as well as to the northern coast of South America. They are known to occur on the deepwater reefs of the southeastern United States in depths ranging from 107 to 198 m (350 to 650 ft). They inhabit irregular bottoms including steep cliffs, notches and rocky ledges of the continental shelf break. Warsaw groupers can obtain weights of over 112 kg (300 lbs). Very little information exists on their reproduction. They are slow growing and long-lived, possibly exceeding 25 years in age. Their main prey items include crabs, shrimp and fish.

Mortality from fishing is considered the major threat to this species, which has been designated as “overfished” as defined by the MSFCMA of 1996. Currently, the South Atlantic Council’s Snapper grouper FMP allows the landing of 1 fish per vessel per trip; sale is prohibited. Warsaw groupers were listed as candidate species in 1997.

Information provided by:

http://www.nmfs.noaa.gov/prot_res/species/fish/warsaw_grouper.html and
SAFMC Habitat Plan for the South Atlantic Region (1998)

Nassau grouper, *Epinephelus striatus*

Nassau groupers are distributed in the waters off Bermuda and Florida and throughout the Bahamas and the Caribbean Sea down to southern Brazil. Primarily a shallow water species, they generally occur from inshore to about 100 m (328 ft) in depth. Adults typically inhabit shallow, high-relief coral reefs and rocky bottoms extending to at least 90 m (295 ft). Juveniles have been found around coral clumps covered with macroalgae and in seagrass beds. The occurrence of this species depends on the distribution of reefs and hard substrates as well as the locations of seasonal, spawning sites. Off the Atlantic coast of Florida, catches ranged from less than 5.6 km (3 nm) from shore to 22.2 km (12 nm). The main prey items for juveniles are crustaceans whereas adults appear to forage primarily on fish. Outside of spawning aggregations, adults are solitary. It remains unclear as to whether Nassau are strictly protogynous. It appears that juveniles may go through a bisexual stage with the young maturing to become either male or female. Nassau groupers are slow growing and obtain a large size at sexual maturity.

This species remains an important fin fish throughout the Caribbean. Because of known site-specific spawning areas, they have been easily targeted during reproduction. In Atlantic waters, they were taken mostly from the Florida Keys. Overexploitation in fisheries is believed to be the main reason for this species decline. Considered “overfished” under the MSFCMA of 1996, commercial and recreational harvest is prohibited under the South Atlantic Council's Snapper grouper FMP. Harvest is also prohibited in the Gulf of Mexico and in Florida. Nassau have been listed as a candidate species since 1991.

Information provided by:

http://www.nmfs.noaa.gov/prot_res/species/fish/nassau_grouper.html and
SAFMC Habitat Plan for the South Atlantic Region (1998)

Atlantic White Marlin, *Tetrapturus albidus*

Atlantic white marlins are found in offshore waters throughout the tropical and temperate Atlantic Ocean and adjacent seas. They usually occur in depths of over 100 m (325 ft). This species is often associated with upwellings and weedlines as well as regions with benthic geographic features such as drop-offs, canyons and shoals. White marlin may reach weights of

82 kg (180 lbs). Primarily a daytime feeder, principal prey items include squid and bony fish such as dolphin, blue runner and mackerels. Spawning occurs once a year in subtropical waters during early summer. It is thought that spawning occurs in pairs as opposed to aggregate spawning.

Atlantic white marlins are popular game fish. They are commonly caught by trolling at or near the surface. Recently NOAA Fisheries was petitioned to list this species as endangered under the ESA, however, NOAA Fisheries determined a listing was not warranted at this time. As such, the Atlantic white marlin was placed on the candidate species list and its status will be re-evaluated in 2007.

Information provided by:

<http://www.flmnh.ufl.edu/fish/Gallery/Description/WhiteMarlin/WhiteMarlin.html>.

Effects of Action(s) on Listed Species and Designated Critical Habitat Occurring in the Action Area

Effects on Listed Marine Mammals

The southeastern U.S. Atlantic pelagic hook-and-line fisheries are listed as Category III fisheries under the MMPA due to the low risk of interaction with marine mammals. NOAA Fisheries has received a few reports of whale entanglements in hook-and-line gear but on further examination of these events, the whales appeared not to have been injured or were able to disentangle themselves from the gear.

Currently, the hook-and-line fishery within the action area consists of trolling for pelagic species. The Council's preferred alternative would extend the prohibition on fishing for and retention of snapper grouper species within the action area for an indefinite period with a 10-year re-evaluation by the Council. As such, trolling for pelagic species would continue as the fishery conducted within the action area. Alternatives rejected by the Council include Alternatives 2 through 5, which would also extend the prohibition on fishing for and retention of snapper grouper species within the action area for at least an additional 10-year period or more and Alternative 6 - no action, which would allow regulations prohibiting harvest of snapper grouper species within the *Oculina* Experimental Closed Area to "sunset" on June 27, 2004. The latter alternative would allow for the harvest of snapper grouper species within the action area. Traditionally, deepwater snapper grouper species are targeted by bottom fishing with vertical hook-and-line gear (primarily using electric or hydraulic reels known as "bandit" gear). However, due to the infrequency of known interactions of marine mammals with hook-and-line gear, the potential for adverse effects from hook-and-line fisheries within the action area is considered discountable.

Effects on Sea Turtles

Currently, the hook-and-line fishery within the action area is executed by trolling. To date, there has not been a report of an incidental capture of a turtle via trolling. Though a potential may exist, the risk is considered low as the speed at which the bait is pulled through the water is generally faster than a turtle can easily catch. (Due to the lack of evidence showing interactions of trolled gear with sea turtles together with the low risk of turtles retrieving bait off a trolled hook, the potential for adverse effects from the hook-and-line fishery currently conducted within the action area is considered discountable). The Council's preferred alternative would extend the prohibition on fishing for and retention of snapper grouper species within the action area for an

indefinite period with a 10-year re-evaluation by the Council; thus trolling for pelagic species would continue as the fishery conducted within the action area. Alternatives rejected by the Council include Alternatives 2 through 5, which would also extend the prohibition on fishing for and retention of snapper grouper species within the action area for at least an additional 10-year period or more and Alternative 6 - no action, would allow regulations prohibiting harvest of snapper grouper species within the *Oculina* Experimental Closed Area to “sunset” on June 27, 2004. The latter alternative would allow for the harvest of snapper grouper species within the action area. Traditionally, deep-water snapper grouper species are targeted by bottom fishing with vertical hook-and-line gear (primarily using electric or hydraulic reels known as “bandit” gear).

Bottom fishing with vertical hook-and-line gear may present more of a risk for sea turtles as the turtle may be more capable of biting the bait and become incidentally hooked. Data on sea turtle interactions with hook-and-line gear in the southeastern Atlantic are scant. The NOAA Fisheries Southeast Fisheries Science Center (SEFSC) has initiated a program to collect information on the type and amount of marine discards occurring within the snapper grouper (and king / Spanish mackerel) fishery in the southeastern United States. The discard survey is supplemental to the existing logbook program, and selects a sub-sample of 20% of the vessels permitted within the fishery to report. In the South Atlantic, a total of 26,114 trips reported using handline or “bandit” gear for the period 8/1/01 through 7/31/02. Of these, 2,028 (8%) of trips reported discard data. Only four (0.2%) of the trips for which discards were reported included an interaction with a sea turtle. Of those four trips, all except one were day trips with the exception being a seven day cruise. Three of the trips occurred off North Carolina with the other trip (targeting king mackerel) occurring off the southern tip of Florida. All four trips reported incidentally capturing one turtle during their trip and releasing the turtle alive. (J. Poffenberger, SEFSC, Personal Communication).

Though information on sea turtle interactions with vertical hook-and-line gear are limited, such interactions do occur. Consequently, Alternative 6 would provide less biological protection to sea turtles than the other alternatives. However, as Alternative 6 has been rejected by the Council and the majority of comments received during the public comment period for Amendment 13A are in support of continuing with the prohibition on fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area, it is highly likely that the regulations within the *Oculina* Experimental Closed Area will be extended.

Effects on Critical Habitat

No critical habitat designation for listed species in the southeast Atlantic occur in the action area. This includes the currently designated critical habitat for the western North Atlantic right whale with the boundaries: 31°15' N. to 30°15' N. latitude from the shoreline out to 15 nm and 30°15' N. and 28°00' N. latitude from the shoreline out to 5 nm.

Beneficial Effects of Preferred Action

The continued prohibition on fishing for and retention of snapper grouper species within the action area provides enormous benefit to sea turtles by eliminating the effort of fishers targeting snapper grouper species, who traditionally harvest deepwater snapper grouper species via bottom fishing with vertical hook-and-line gear, and thus reduce the risk of turtles being able to interact with baited hooks. Sea turtles are known to transit through the action area or, in some cases,

remain in the area for extended periods of time. Studies using satellite and radio/sonic telemetry have begun to reveal important information regarding seasonal migrations and regional movements of sea turtles (Murphy and Hopkins 1981; Meylan 1982; Gitschlag 1996). Such studies have shown that while certain turtles prefer to undergo extensive movements among areas, some individuals appear to show strong fidelity to a particular site. One such individual, a loggerhead named “Flora” was tagged as part of South Carolina Department of Natural Resource’s (SCDNR) 1998 Satellite Telemetry Program. “Flora” over the course of a year, displayed a strong interest in the area near the southern portion of the action area (Figure 2).

As with turtles, snapper grouper species on the candidate species list would also benefit from the continued prohibition on the fishing for and retention of snapper grouper species within the *Oculina* Experimental Closed Area. Two of the four candidate snapper grouper species, Warsaw grouper and speckled hind, regularly occur within the *Oculina* Bank area while Goliath and Nassau groupers may potentially occur in the area given their range and habitat preferences. In addition, juvenile speckled hind have been observed in *Oculina* thickets suggesting that this habitat may also function as a nursery for this species. Measures to further the conservation and enhance the recovery of these candidate species, such as extending the prohibition on fishing for and retention of snapper grouper species within *Oculina* Experimental Closed Area beyond its “sunset” date, may aid in preventing them from being listed in the future.

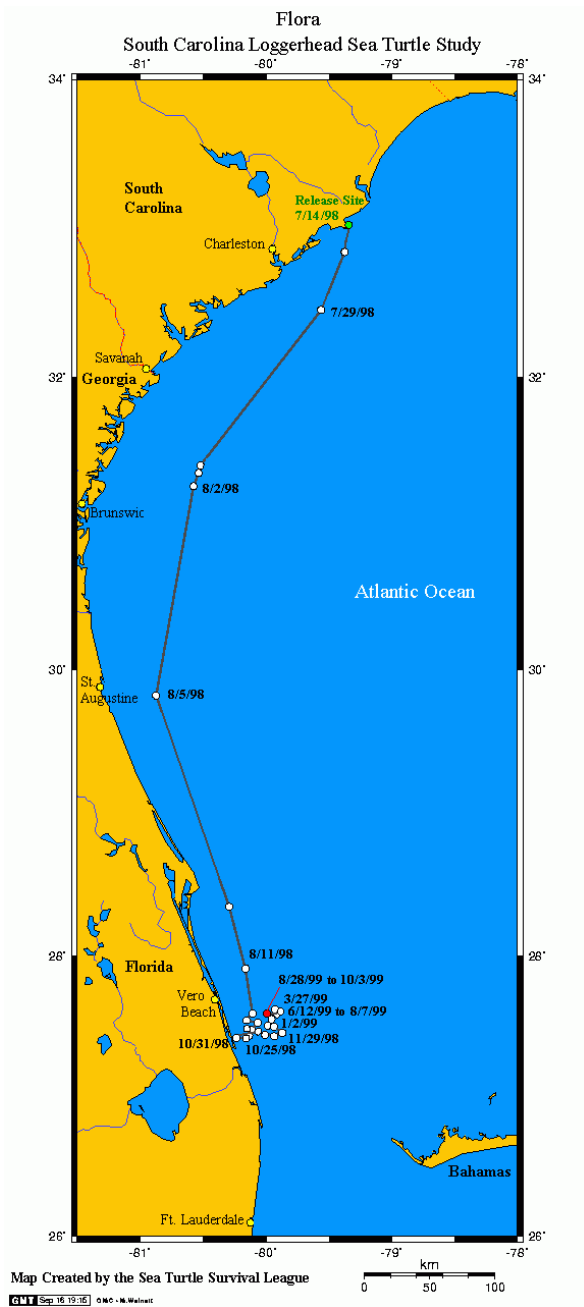


Figure 2. Movement of “Flora” from SCDNR 1998 Satellite Telemetry Project.
(For further information, visit <http://cccturtle.org/satflora.htm> and
<http://www.dnr.state.sc.us/marine/turtles/>). Credit SCDNR and Caribbean Conservation Corp

Cumulative Effects

“Cumulative effects” refer to any known unrelated, future, non-federal activities reasonably certain to occur within the action area that are likely to affect listed or proposed species. For marine mammals occurring in the action area, the potential for adverse effects from hook-and-line fisheries within the action area is considered discountable. However, marine mammal species may incur negative impacts from other sources such as disease, vessel strikes, entanglement in other fisheries and habitat degradation due to chemical and noise pollution as well as marine debris. These impacts may cause adverse effects on a population’s overall recovery. For detailed descriptions on cumulative impacts to listed marine mammal species found in the action area see Waring et al. (2002).

To fully assess the recovery of sea turtles, the full range of human and natural phenomena also need to be considered. Hurricanes may have potentially negative effects on the survival of eggs or on nesting habitat itself if the beach is greatly reduced. Human-related activities pose multiple threats such as entanglement in fishing gear, loss of nesting habitat due to coastal development, impacts on the orientation of nesting females and just hatched young by artificial lighting on nesting beaches, degradation of the marine habitat by chemical pollution and marine debris with the latter being a particular problem for sea turtles as many types of plastics are perceived as food items, and the direct taking of eggs or individual turtles whether legal or illegal. The impacts of many of these activities are under-monitored, particularly on the international level. NOAA Fisheries has estimated that thousands of sea turtles of all species are incidentally or intentionally caught or killed annually by international activities (NMFS 2001a).

Some anthropogenic (human induced) mortality that contributed to the decline of sea turtles has been mitigated since sea turtles were listed under the ESA. Examples of such include the use of TEDs in shrimp trawlers, reduction or closure of certain fisheries using entangling nets and the prohibition of harvesting eggs and nesting females in the U.S. as well as other areas (for further information on sea turtle impacts see NMFS 2001a; NMFS SEFSC 2001).

Determinations

- 1) The action as proposed may affect - is not likely to adversely affect - Johnson’s seagrass, shortnose sturgeon, smalltooth sawfish, American crocodile and the West Indian manatee:
- 2) The action as proposed may affect - is not likely to adversely affect - sperm, blue, fin, sei, humpback, and northern right whales; or Kemp’s ridley, green, Hawksbill, leatherback and loggerhead sea turtles.
- 3) The action as proposed is not likely to destroy or adversely modify critical habitat designated in the U.S. southeastern Atlantic region.

Recommendations

- 1) For the Council to maintain flexibility within future FMP's (via framework) to allow for modifications in gear and/or fishing practices shown to reduce the threat of incidental capture of protected species.
- 2) For NOAA Fisheries to implement aspects of the Atlantic Coastal Cooperative Program (e.g., observer coverage) to allow for collection of the necessary data to better define, measure and monitor interactions of protected species with hook-and-line fisheries.
- 3) For both the Council and NOAA Fisheries to continue public outreach to both commercial and recreational fishermen with regard to protected species and fisheries. Specifically, provide information pertaining to appropriate procedures if an interaction with a protected species occurs, as well as guidelines to release and, if necessary, resuscitate sea turtles.

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Appendix D. Preliminary Observations from the Most Recent Cruise in the *Oculina* Bank

The following are preliminary conclusions from this most recent *Oculina* cruise (Source: John Reed, pers. comm):

In ten days (8 dive days), twenty-three ROV dives and 34 sediment grab samples were conducted throughout the reserve, which covered nearly 35 nm of bottom ($\sim 0.05\text{nm}^2$) and resulted in more than 40 hours of underwater videotape documentation and 2,000 digital still images. Target dive sites included historical sites not seen for nearly 25 years and unexplored areas identified from a 2002 multi-beam survey both inside and outside the *Oculina* Habitat Area of Particular Concern (OHAPC). Dive results support conclusions from a 2001 expedition that much has changed during the past two decades, including habitat destruction and significantly reduced populations of commercially and recreationally important fish since the 1970s. On the positive side, qualitative observations of note include:

- Several isolated live *Oculina* thickets within the newly expanded OHAPC were discovered in places that had never been explored previously. The multi-beam provided the target evidence that led to these discoveries which are in low to moderate relief topographic regions.
- Extensive live bottom areas (hard bottom with live benthos and fish) were documented; we found that considerable portions of the Multibeam chart that indicate featureless yellow, green, or orange zonation are actually live bottom.
- Extensive areas of more than 23 high relief *Oculina* pinnacles were discovered outside and to the west of the OHAPC, between the Cape Canaveral and Cocoa Beach Satellite regions of the OHAPC.
- Several remnants of bottom trawl nets were documented in the closed area of the original OHAPC; at least one was fairly recent based on degree of fouling, suggesting illegal trawling occurred.
- Many of the high relief pinnacles are primarily coral rubble of unknown age, but many have small (10-50 cm) colonies of live *Oculina* on their southern slopes; many also have live bottom at the base of their northern flanks where rock pavement, boulders and ledges provide habitat for fish and benthic fauna.
- Areas of standing dead coral colonies (10-50 cm diameter) are fairly common on high relief pinnacles, on low and moderate pavement and rubble areas, and along the rims of depressions that are probable scour areas at the northern base of the high pinnacles; Reed's historical data from the 1970's and 1980's suggests that many more of these corals were alive then but are now dead from unknown cause(s); since these corals are standing the cause of death is not likely trawl related.

APPENDIX E. SUPPLEMENTARY REGULATORY IMPACT REVIEW AND REGULATORY FLEXIBILITY ACT ANALYSIS FOR AMENDMENT 13A TO THE FISHERY MANAGEMENT PLAN FOR THE SNAPPER-GROUPER FISHERY OF THE SOUTH ATLANTIC REGION

Prepared by NOAA Fisheries SER Economics Office

October 2003

1.0 Introduction

1.1 Introduction

The South Atlantic Council prepared Amendment 13A to the Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic Region (SG-13A). The purpose and intent of the of the proposed amendment is included in Section 1.0 of SG-13A and is incorporated herein by reference. In summary, the purpose of the proposed amendment is to provide continued protection of snapper-grouper populations and associated *Oculina* coral in the *Oculina* Experimental Closed Area in order to provide a hedge against the high degree of scientific uncertainty associated with the status of snapper-grouper species and to reduce the possibility that these populations may fall below sustainable levels. The proposed amendment would extend harvest prohibitions for snapper-grouper species originally established through Amendment 6 to the Snapper-Grouper FMP (SAFMC 1993) (hereafter referred to as the prohibition), implemented in 1994, which are scheduled to sunset in June 2004. This document supplements the economic impact assessment contained in SG-13A. The primary focus of this supplement is an examination of fishery conditions prior and subsequent to the original prohibition and an attempt to draw conclusions with regards to the proposed alternatives.

1.2 Description of the Fishery

The following discussion re-presents information contained in SG-13A and additional information assembled since development of the original assessment. Certain tables will be reproduced in their entirety, but are re-numbered to reflect organization of the current document. The remainder of the fishery information contained in SG-13A is incorporated herein by reference.

1.2.1 Commercial Fishery

The current snapper-grouper permit system does not assign unique identification numbers to a permit. It is, therefore, not possible to identify the total number of unique permits that exist in the fishery without an exhausting manual comparison of all permit applications and transfers. Thus, it is not known how many snapper-grouper permits exist. It is possible, however, to identify the number of unique vessels that participate in the fishery through examination of vessel identification numbers. Table 1 presents the number of unique commercial vessels that were permitted to fish for snapper-grouper during some portion of the respective year from 1999-2002. It should be noted that while the number of unique vessels does not equal the number of unique permits since a permit may be fished from more than one vessel over the course of the

year, the number of permits cannot exceed the number of vessels. Thus, the number of permits is no greater than the number of unique vessels. As shown in Table 1, the number of vessels that operated in the snapper-grouper fishery consistently declined over the

4-year period, declining by, on average, 89 vessels per year. On average, 1,305 vessels operated in the fishery for some portion of each year.

Table 1 (11a in SG-13A). Number of commercial vessels permitted to fish for snapper-grouper in the South Atlantic during some portion of the year. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Home Port	Total Vessels			
	1999	2000	2001	2002
Florida	1,082	1,001	945	883
North Carolina	230	201	186	168
South Carolina	84	93	93	87
Virginia	15	15	13	13
Georgia	15	12	14	13
New Jersey	5	6	6	7
New York	4	5	2	2
Louisiana	2	3	1	
Maine	1	2	2	
Unknown		1		
Massachusetts		1	1	
Tennessee	1	1	1	1
California		1		
Colorado		1		
Grand Total	1,441	1,341	1,264	1,174

Table 2 presents similar information for 1993 and 1995, the last and first full years prior to and after the establishment of the prohibition. As can be seen from the table, while the number of unique vessels increased in 1995 over 1993, approximately twice the number of vessels operated in the fishery during this period, on average, than in more recent years. Although not shown in the table, participation in 1997 was similar to that of 1996, though down slightly at 2,716 vessels. Some discussion of these results is important. It should be noted and recalled from discussion in SG-13A that while permits were required for participation in each of the years examined, the nature of the permit varied from the earlier years to the more recent years. For the 1993-1997 years, the snapper-

Table 2. Numbers of unique vessels and “annual permits”* operating in the snapper-grouper fishery.

Category	1993	Range	1995	Range	2002	Range
Vessels	2,422	-	2,764	-	1,174	-
Annual Permits	1,264	312-2,164	1,237	1,043-1,566	1,074	1,034-1,107

*SG permits for 1993 and 1995, SG1 (unlimited harvest) + SG2 (limited harvest) permits for 2002. The number of “annual permits” is the daily number of non-expired permits averaged over the course of the entire year.

grouper permit was a generic permit required for all participants but which contained no harvest/trip limit restrictions. In 1998, however, two classes of permits were established which, based on historical participation, established trip limits. The first class of permit allow

unlimited snapper-grouper harvests per trip, while vessels operating under the second class of permit were subject to a 225-lb trip limit. Each class of permit additionally had different restrictive transfer provisions, such that the total number of valid permits of either type could not increase and would, logically be expected to decrease over time as transfer occurred. Thus, the decline in the number of vessels operating in the fishery is consistent with expectations and should not be interpreted as an indication of deteriorating conditions in the fishery or other restrictions placed on the fishery, such as the prohibition.

The number of individual entities that participate in the fishery is an important factor of fishery assessment since it quantifies the number of individual businesses potentially impacted by a regulation. Unfortunately, this number cannot be determined with certainty and must, instead, be estimated by proxy. The number of unique vessels that operate in the fishery is the best estimate of individual entities that exists at this time. It should be recognized, however, that the number of unique vessels likely overestimates the true number of entities since permit transfer to another vessel owned by the same individual can occur. Thus, the same permit could be fished from multiple vessels suggesting multiple entities when, in fact, the same individual was involved. Hence, the number of unique vessels should be considered an upper bound on the number of entities/participants in the fishery.

The number of unique permits that exist in a fishery is also a useful factor in fishery assessment since it provides an indication of potential capacity in the total fishery from the standpoint that it represents the number of potential equivalent vessel years, where an equivalent vessel year is conceptually defined as a vessel that has the opportunity to participate in the fishery over the course of the entire year. For instance, although a given permit may be used at different times by two (or more) different boats over the course of the year, both (all) boats may not simultaneously fish the same permit. Hence, the two vessels (assuming no other vessels fished that permit) would count as a single equivalent vessel year. As previously stated, the number of unique permits that operate in the fishery cannot be determined since unique permit identifiers/numbers do not exist. Permit records do allow the identification of the number of non-expired permits that exist on any given day and, through the daily assessment, the range of non-expired vessel counts over the course of the year. These totals are not provided, however, since they do not provide useful indices for the following reasons, and may, instead, simply lead to false impressions. The daily averages do not reveal the total number of permits existent in the fishery since the renewal process is based on the holder's birthday and the holder of the permit has one year upon expiration for renewal. Thus, certain permits expire, and others are renewed, on a daily basis and, while the daily total may, in some cases, appear to be stable, consecutive daily totals do not necessarily represent the same permits. A more meaningful figure is, perhaps, the maximum of the range, but even this figure would not capture those permits that have expired in the previous 364 days and have yet to be renewed. Thus, although the totals may appear to represent useful information from one period to the next and/or in relation to changes in vessel numbers, they neither accurately represent the total number of permits, nor serve as an adequate proxy for effort.

Table 1 also presents the distribution of the snapper-grouper permitted vessels by state of homeport. Approximately 75% of all vessels were homeported in Florida, regardless of class of snapper-grouper permit, and 84% of vessels with harvest unlimited permits were homeported in Florida. Table 3 presents the geographical distribution of Florida homeported vessels relative to the area of interest determined by the prohibition, where the "area of interest" is defined as those home port locations on the Florida Atlantic coast from Cape Canaveral south to West Palm

Beach. The intent of this breakout is to identify the number of vessels with the greatest potential to be impacted by continuation of the prohibition on the basis of geographic proximity to the prohibited area. On average over the 4-year period, approximately 14% of the vessels homeported in Florida, or 10% of all vessels permitted to participate in the snapper-grouper fishery were homeported in the area of interest. Similar breakouts are not available for the fishery prior to and immediately subsequent to the prohibition. Assuming, however, that the homeport distribution from 1999-2002 adequately captures that of 1993 and 1995, then approximately 254 vessels $[(0.75*2422)*0.14]$ that participated in the snapper-grouper fishery are estimated to have been homeported in the area of interest in 1993 and 290 vessels $[(0.75*2764)*0.14]$ in 1995.

Table 3 (11c in SG-13A). Geographic distribution of the home port of vessels in Florida permitted to fish for snapper-grouper during some portion of the respective year. Source: Southeast Permits Database, NOAA Fisheries, Southeast Region.

Location	1999	2000	2001	2002
Area of Interest*	148	142	135	120
North of the Area of Interest	103	89	82	87
South of the Area of Interest	194	172	158	149
Florida Keys	579	547	519	475
Gulf Coast	58	51	51	52
Grand Total	1,082	1,001	945	883

*The area of interest includes home port locations along the Florida Atlantic coast from Cape Canaveral to West Palm Beach.

Table 4 presents dockside landings and ex-vessel value of snapper-grouper harvests from 1981-2001. As can be derived from the contents of the table, the average harvest of snapper-grouper from 1991-1993 (the three years prior to the prohibition and additional harvest restrictions) from the entire South Atlantic area was 11.04 million pounds with an ex-vessel value of \$18.78 million (real ex-vessel value), and an average price of \$1.70 per pound. Similar numbers for the Florida east coast portion of the fishery, ex-cluding the Florida Keys, were 4.91 million pounds with an ex-vessel value of \$7.32 million, and an average price of \$1.49 per pound. The east coast Florida component of the fishery, therefore, contributed approximately 44.5% of the harvests and 39.0% of the ex-vessel value during this period.

For 1995-1997, the first three years after the prohibition and additional harvest restrictions, the respective estimates, with the percent changes from the 1991-1993 figures provided in parentheses, are 8.42 million pounds (23.7% reduction), \$14.46 million (23.0% reduction), and \$1.72 per pound (1.2% increase) for harvest of snapper-grouper from the entire South Atlantic area, and 3.32 million pounds (32.4% reduction), \$5.44 million (25.7% reduction), and \$1.64 per pound (10.1% increase) for harvest of snapper-grouper from the Florida east coast. The Florida east coast component of the fishery, therefore, contributed approximately 39.4% of the harvests and 37.6% of the ex-vessel value during this period.

It should be observed that regardless of the geographic perspective taken, with the exception of two slight increases in total South Atlantic harvest from 1992-1993 and from 1996-1997, and

one increase for the Florida east coast from 1999-2000, a steady decline in harvest was exhibited from not only 1991-1997, but also continuing through 2001. Also, although additional management measures were implemented during the 1991-1993 seasons, as described in Section 1.5 of SG-

Table 4 (13a in SG-13A). Dockside landings and ex-vessel value of snapper-grouper for the period 1981-2001 in the southern Atlantic states. Source: NOAA Fisheries, SEFSC.

South Atlantic (includes the Keys)				Florida East Coast excluding the Keys		
Year	Landings (pounds)	Ex-vessel Revenue	Real Ex-vessel Value (\$2001) *	Landings (pounds)	Ex-vessel Revenue	Real Ex-vessel Value (\$2001) *
1981	12,089,02	\$9,430,58	\$18,373,552	4,376,191	\$3,202,174	\$6,238,779
1982	13,727,11	11,184,38	20,525,954	5,955,322	4,772,619	8,758,869
1983	10,230,00	9,572,412	17,020,825	3,881,448	3,820,892	6,793,976
1984	10,071,28	9,565,674	16,304,917	3,476,771	3,158,947	5,384,500
1985	8,809,355	9,654,677	15,890,737	3,169,850	3,510,655	5,778,225
1986	9,340,164	11,776,670	19,029,637	3,836,391	4,751,645	7,678,069
1987	8,900,596	10,355,056	16,143,314	4,385,417	4,328,139	6,747,477
1988	9,642,320	11,956,594	17,899,516	3,985,994	4,439,796	6,646,559
1989	12,214,62	16,471,973	23,525,697	5,622,226	7,171,112	10,241,967
1990	14,885,03	19,890,672	26,952,089	6,865,561	8,575,587	11,620,019
1991	12,059,82	16,508,001	21,465,249	5,352,100	6,550,435	8,517,489
1992	10,646,25	13,648,155	17,227,999	4,794,057	5,172,450	6,529,158
1993	10,406,24	14,392,749	17,639,833	4,600,319	5,650,216	6,924,936
1994	10,610,03	14,649,408	17,506,141	4,420,053	5,512,242	6,587,166
1995	9,255,523	13,736,410	15,962,718	3,874,976	5,470,320	6,356,914
1996	7,987,078	12,208,749	13,780,557	3,172,372	4,675,449	5,277,387
1997	8,015,175	12,362,149	13,640,726	2,923,695	4,249,666	4,689,195
1998	7,287,773	11,805,392	12,826,595	2,759,095	4,073,829	4,426,228
1999	7,019,099	12,105,367	12,868,310	2,456,502	3,735,538	3,970,971
2000	7,013,320	12,613,801	12,972,730	2,663,309	4,228,346	4,348,665
2001	6,922,642	12,551,479	12,551,479	2,135,192	3,554,075	3,554,075

* Real value was calculated using the Consumer Price Index (CPI) and represents the purchasing power of earnings of a respective year in 2001 dollars.

13A, that may have contributed, in addition to declining conditions in the resource that stimulated the management change, to the declining performance, the range of harvests (difference between the high and low years) during this period varied by 14% for both the total South Atlantic and the Florida east coast. During the 1995-1997 fishing years, however, a period during which no additional commercial harvest restrictions were imposed, while snapper-grouper harvests for the total South Atlantic varied again by 14%, those of the Florida east coast varied by 24%. These figures coupled with the declines in the Florida east coast performance support the findings that, while the east coast Florida component of the fishery contributed only 39.4% of the harvests and 37.6% of the ex-vessel value during this period, this sector bore approximately 60.7% of the decline in harvests from 1991-1993 to 1995-1997 and 43.5% of the decline in ex-vessel value.

Although additional management measures were imposed during the 1998-2001 period that likely contributed to the changes in fishery performance, it may be instructive to compare 1995-2001 with the 1991-1993 fishery performance figures. For 1995-2001, the respective estimates,

with the percent changes from the 1991-1993 figures provided in parentheses, are 7.64 million pounds (30.8% reduction), \$13.51 million (28.1% reduction), and \$1.77 per pound (4.1% increase) for harvest of snapper-grouper from the entire South Atlantic area, and 2.85 million pounds (42.0% reduction), \$4.66 million (36.3% reduction), and \$1.64 per pound (10.1% increase) for harvest of snapper-grouper from the Florida east coast. The east coast Florida component of the fishery, therefore, contributed approximately 37.3% of the harvests and 34.5% of the ex-vessel value during this period. In comparison with the 1995-97 figures, fishery conditions declined even further over the 1998-2001 period, resulting in a lower average performance for the entire 1995-2001 period relative to the 1995-1997 period.

Some comment is appropriate on the price information presented. As recalled from above, the average real price for snapper-grouper for the entire South Atlantic region differs from (is greater than) that received by Florida east coast harvests, and the average price received, regardless of the geographic break-out, has increased from 1991-1993 to 1995-1997 and 1995-2001. It should be understood that the real price is neutral to inflation and, therefore, should simply reflect supply-demand effects on price (for a given level of demand, as supply decreases, price increases; note that this assumes a relationship exists; it is possible, however, that the market is dominated by imports such that variation of domestic supply has little to no impact on price received) and the effects of species composition/product mix (not all snapper-grouper species share the same level of consumer preference/demand; thus, as the species mix changes, so will the average price). Absent price models, which do not currently exist for this complex or individual species, it cannot be determined whether the price changes exhibited for the fishery are a result of supply/demand factors or changes in species composition of the total harvest. Harvest declines in the entire South Atlantic snapper-grouper fishery after the prohibition among the individual species where major differences were seen, however, as shown in Table 5, ranged from a 9.5% for red snapper (note: the percentage changes are not shown in the table) to 91.5% for Warsaw grouper. Several species exhibited in excess of 50% declines: wreckfish, 65.8%; tilefish, 53.1%; unclassified scups or porgies, 66.3%; unclassified snappers, 81.0%, unclassified groupers, 74.4%; and Warsaw grouper. Two species experienced increases, triggerfishes (91.5%) and blue runner (46.3%). For the Florida east coast, the range in declines was 20.2% for amberjack to 96.2% for Warsaw grouper. Species experiencing greater than 50% declines were: wreckfish, 75.1%; tilefish, 53.2%; unclassified scups or porgies, 50.2%; unclassified snappers, 79.4%; unclassified groupers, 79.0%; and Warsaw grouper. Species experiencing increases in harvests were: snowy grouper, 11.9%; red snapper, 23.7%; blue runner, 49.3%; grunts, 74.7%; and red porgy which increased from 0 to 43,000 pounds. An examination of the species in the snapper-grouper complex potentially affected by the proposed action, as shown in Table 6, shows only three of the species that experienced differences in harvests to be among the species most likely to be affected, amberjack which, as shown, experienced an 11.9% decline in total South Atlantic harvests and a 20.2% decline from east coast Florida, and snowy grouper and red porgy, both of which experienced increases. While other individual species are likely captured in the unclassified landings, there is insufficient evidence to draw any conclusions on the impacts of changing species mixes in the combined snapper-grouper harvest on the price increase.

1.2.2 Recreational Fishery

The description of the snapper-grouper recreational fishery contained in SG-13A sufficiently portrays the key aspects of the sector and comparison of fishery characteristics before and after the prohibition, as well as current conditions. This description is, therefore, incorporated herein

by reference. The key findings of the description are summarized and repeated here for completeness. The primary elements of comparison and analysis presented are effort and harvests. From the perspective of total South Atlantic activity, the number of charter, private boat and shore angler trips where snapper-grouper species were caught increased by approximately 3% in 1995-1997 over 1991-1993. This increase not only persisted but grew through 2002, with the 1995-2002 average number of trips increasing

Table 5 (13b in SG-13A). Species where there were major differences in landings (Pounds) prior to and after the closure. Source: NOAA Fisheries, SEFSC.

Species Name	South Atlantic		Florida East Coast	
	Average 1991, 1992,	Average 1995, 1996,	Average 1991, 1992,	Average 1995, 1996, 1997
Wreckfish	1,364,259	465,462	621,443	154,506
Tilefish	1,072,373	502,574	673,458	315,467
Crevalle	578,872	333,582	569,340	325,549
Sheepshead	417,540	267,980	362,887	189,538
Amberjack	1,173,157	1,033,700	832,213	663,780
Scups or Porgies, Unc.	276,296	93,019	160,272	79,821
Snappers, Unc.	82,607	15,664	63,386	13,023
Grouper, Unc.	192,244	49,168	52,443	11,038
Snapper, Yellowtail	169,926	127,303	168,145	127,226
Snapper, Mutton	113,281	74,335	110,098	71,181
Grouper, Black	81,402	44,794	73,728	43,827
Triggerfishes	311,622	513,467	89,322	71,135
Grouper, Warsaw	18,507	1,566	16,463	618
Sea Basses	1,028,636	855,821	29,240	14,780
Grouper, Yellowedge	35,229	18,549	26,332	14,798
Grouper, Snowy	471,489	381,824	135,663	151,842
Snapper, Red	151,531	137,033	70,259	86,921
Blue Runner	52,833	77,314	50,320	75,170
Grunts	275,356	251,649	53,468	93,420
Porgy, Red	389,196	356,673	0	43,089
Total Landings	11,037,440	8,419,259	4,915,492	3,323,681
Total Value	\$14,849,635	\$12,769,103	\$5,791,034	\$4,798,478
Total Real Value	\$18,777,694	\$14,461,334	\$7,323,861	\$5,441,165

by 13.8% over 1991-1993. The charter sector exhibited the most dramatic increase, with the average number of trips for 1995-1997 45% greater than 1991-1993, and 35% greater for 1995-2002. The private sector exhibited 7.5% and 18.7% increases in the respective periods. Total fishing trips in the South Atlantic, regardless of species caught, increased by 7.4% in 1995-1997 over 1991-1993, and remained at this level over 1995-2001 relative to 1991-1993.

For just the Florida east coast (not including the Florida Keys), the total average number of angler trips that caught snapper-grouper increased 15.0% in 1995-1997 over 1991-1993, and 28.3% during 1995-2002. The charter sector remained unchanged in 1995-1997, but experienced a dramatic increase in subsequent years, resulting in a 63.8% increase for 1995-2002. The private boat sector experienced 12.3% and 24.5% increases over the respective periods. With regards to the distance from shore where snapper-grouper are caught, 4.2% more

snapper-grouper were caught in the EEZ in 1995-1997 relative to 1991-1993. Over the 1995-2002 period, this number increased to 22.9% more trips than during 1991-1993. Total fishing trips for the Florida east coast, regardless of species caught, increased by 7.7% in 1995-1997 over 1991-1993, but declined to 4.4% over 1995-2001 relative to 1991-1993. Thus, advances in snapper-grouper trips outpaced advances in total effort.

Examination of effort in the headboat sector is, as described in SG-13A, somewhat more complicated since data are collected via vessel logbook rather than from individual angler anglers. Thus, it is not possible to determine the number of individual angler trips that fish for or successfully catch snapper-grouper. However, due to the nature of headboat operation, such that bottom fishing is the primary method of fishing, it can be safely assumed that snapper-grouper are a primary target species on all trips and at least some snapper-grouper are caught on every headboat trip. Thus, while the available measure of headboat effort, the standardized angler day, does not represent catch success, it can reasonably be used as a proxy for catch intent. Therefore, as shown in SG-13A,

Table 6 (Table 4 in SG-13A). Species in the snapper grouper fishery management unit potentially affected by the proposed action, ranked by general abundance in the *Oculina* Experimental Closed Area based on Koenig *et al.* (in press) and documented depth distribution.

Common Name	Scientific Name	Depth Distribution (ft)
Greater amberjack	<i>Seriola dumerili</i>	60-1,181
Scamp	<i>Mycteroperca phenax</i>	90-328
Almaco jack	<i>Seriola rivoliana</i>	49-525
Gag	<i>Mycteroperca microlepis</i>	16-328
Snowy grouper	<i>Epinephelus niveatus</i>	190-840
Speckled hind	<i>Epinephelus drummondhayi</i>	90-1,300
Red snapper	<i>Lutjanus campechanus</i>	33-623
Vermilion snapper	<i>Rhomboplites aurorubens</i>	85-600
Red porgy	<i>Pagrus pagrus</i>	59-918
Warsaw grouper	<i>Epinephelus nigritus</i>	200-980
Knobbed porgy	<i>Calamus nodosus</i>	23-295
Blueline tilefish	<i>Caulolatilus microps</i>	98-774
Blackfin snapper	<i>Lutjanus buccanella</i>	164-300
Yellowedge grouper	<i>Epinephelus flavolimbatus</i>	210-900
Black sea bass	<i>Centropristis striata</i>	7-394
Bank sea bass	<i>Centropristis ocyurus</i>	180
Crevalle jack	<i>Caranx hippos</i>	3-1,148
Jolthead porgy	<i>Calamus bajonado</i>	10-656
Lesser amberjack	<i>Seriola fasciata</i>	180-427
Golden tilefish	<i>Lopholatilus chamaeleonticeps</i>	263-1,772
Silk snapper	<i>Lutjanus vivanus</i>	299-794
Queen snapper	<i>Etelis oculatus</i>	328-1,476
Misty grouper	<i>Epinephelus mystacinus</i>	490-1,800

average annual total headboat angler days declined by 20.7% in 1995-1997 over 1991-1993, and by 27.0% during 1995-2001. For northeast Florida through Miami only, the reductions were 30.2% and 36.8%, respectively, indicating not only a decrease in the absolute number of trips in Florida, but also a declining proportion of trips taken in Florida relative to total South Atlantic trips. It is not known what to attribute these declines to since not only has participation in the sector steadily declined since the peak effort in 1987, both in total and for east coast Florida, but also a similar phenomena has been observed for the Gulf coast of Florida, though the decline has not been as dramatic, with the average number of angler days for 1995-1997 only 13.8% lower than during 1991-1993.

An examination of snapper-grouper harvests by the recreational sector in numbers of fish, shows that, while average annual harvests for the entire South Atlantic declined by 20.5% in 1995-1997 relative to 1991-1993, and by 21.7% for 1995-2001, different results occurred in the Florida east coast fishery, which experienced a 3.8% increase during 1995-1997 and an 18.9% increase during 1995-2001. The most remarkable increases were observed in the charter sector, notably harvests in the EEZ, which showed a 63% increase in 1995-1997 over 1991-1993 and a 245% increase in 1995-2002. Overall, however, charter and private angler average annual snapper-grouper harvest from the EEZ declined by approximately 8.5% in 1995-1997 over 1991-1993. As described in SG-13A, however, only two species for which there were major differences in average annual catch during the respective time periods, red snapper and vermilion snapper, are among the more abundant species in the prohibited area. Further, while harvests of red snapper declined for both the private angler and charter sectors, vermilion snapper harvests actually increased for charter anglers.

Combining the results from the discussion above, although there has been a decline in the headboat sector, the increased number of catch trips in the other recreational sectors exceeds the headboat decline. Thus, overall, recreational snapper-grouper effort appears to have increased since the prohibition and accompanying regulations. Further, although total snapper-grouper harvests declined, harvests in the region of more likely direct impact by the prohibition, i.e., the waters off the Florida east coast, has actually increased. While angling patterns may have shifted as a result of the prohibition and other restrictions, changing the location of fishing and the species composition of catch, such has obviously not impeded either the desire to fish or the ability to harvest snapper-grouper species.

2.0 Regulatory Impact Review

2.1 Introduction

NMFS requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: (1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; (2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and (3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way.

The RIR also serves as the basis for determining whether any proposed regulations are a "significant regulatory action" under certain criteria provided in Executive Order 12866 (E.O. 12866) and whether the proposed regulations will have a "significant economic impact on a substantial number of small business entities" in compliance with the Regulatory Flexibility Act of 1980 (RFA).

2.2 Problems and Objectives

The problems and objectives addressed by the proposed amendment, and the purpose and need for the present amendment, are found in Section 1.0 of SG-13A and summarized in Section 1.1 of this document and are incorporated herein by reference.

2.3 Methodology and Framework for Analysis

This RIR assesses management measures from the standpoint of determining the resulting changes in costs and benefits to society. To the extent practicable, the net effects should be stated in terms of producer and consumer surplus, changes in profits, employment in the direct and support industries, and participation by commercial fishermen, charter boat fishermen, and private anglers. In addition to these changes, there are public and private costs associated with the process of developing and implementing the proposed rule.

2.4 Impacts of the Proposed Action

Proposed Action:

Alternative 1. Preferred Alternative - Extend regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper-grouper species for an indefinite period with a 10-year re-evaluation by the Council. The Council will review the configuration and size of the *Oculina* Experimental Closed Area within 3-years of the publication date of the final rule.

Alternative 2. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper-grouper species for an additional 10-year period.

Alternative 3. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper-grouper species for an additional 20-year period.

Alternative 4. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper-grouper species for an additional 50-year period.

Alternative 5. Extend the regulations within the *Oculina* Experimental Closed Area that prohibit fishing for and retention of snapper-grouper species for an indefinite period.

Alternative 6. No action: The regulations that prohibit fishing for and retention of snapper-grouper species within the *Oculina* Experimental Closed Area will sunset on June 27, 2004.

A description of the economic benefits of the proposed action on both the recreational and commercial sectors are contained in SG-13A and are incorporated herein by reference. The following discussion will attempt to provide more extensive discussion of the potential impacts of the proposed action on the commercial harvest sector. Such focus should not be interpreted as a conclusion that the recreational sector is inconsequential with regards to the proposed action, however. Rather, as described in Section 1.2.1, although some modification of fishing practice likely occurred as a result of the original action, there is no appearance that the recreational sector experienced or continues to experience any adverse affects as a result. Therefore, although the recreational sector would be expected to also be capable of receiving benefits similar to those described below should the prohibition sunset, the more potentially significant focus of discussion is the commercial sector due to the declines exhibited in this sector.

In summary, the primary purpose of the proposed action is to provide continued protection of snapper-grouper populations and associated *Oculina* coral. The proposed continuation of the prohibition will provide a hedge against the uncertainty of future fishery conditions and the ability of management to control fishery behavior, may provide protection of spawning aggregations, and will provide protection of a unique ecosystem. Benefits of these protections will accrue in the form of an insurance policy against future fishery collapse and through a variety of use and non-use values associated with both stocks within the protected area itself as well as spillover into stocks in neighboring populations. As stated in SG-13A, however, while these benefits are not quantifiable at this time, their existence is obvious.

SG-13A further provides estimates of certain economic parameters currently generated by the snapper-grouper fishery in the area of interest. As stated in the document, the recreational estimates refer only to activity prosecuted in the EEZ and, therefore, do not presume to represent a complete economic profile of the sector. A similar caveat is raised with respect to the commercial sector, though the perspective is one of participation in other fisheries rather than EEZ versus state territorial waters.

SG-13A also provides a qualitative discussion of the economic costs of the prohibition that take the form of forgone use benefits. The following discussion will attempt to create a quantitative perspective of these costs through revisited discussion of the impacts that may have occurred as a result of the original prohibition, as presented in Section 1.2.1. The focus of the analysis will be on fishery performance in the area of interest.

As previously described, average annual snapper-grouper harvests from the Florida east coast from the three years prior to the prohibition and accompanying regulations, 1991-1993, were 4.91 million pounds with an ex-vessel value of \$7.32 million. For the three years post-regulation, the respective figures were 3.32 million pounds valued at \$5.44 million, or a 32.4% reduction in harvest, and a 25.7% reduction in ex-vessel value. Evaluation of the vessel distribution numbers provided in Table 3 shows that, on average, 34.8% of the snapper-grouper vessels that are homeported in same geographic portion of Florida captured in the Florida east coast harvest figures (this would include the area of interest, and north and south of the area of interest only and not the Florida Keys or Gulf coast vessels) are homeported in the area of interest (when summed across 1999-2001 the totals are 425/1223). Assuming that harvests are

proportional to the distribution of vessels, the average annual snapper-grouper harvests from the area of interest for 1991-1993 are estimated to be 1.71 million pounds with an ex-vessel value of \$2.55 million, and for 1995-1997 are 1.16 million pounds valued at \$1.89 million.

Recalling that 75% of snapper-grouper vessels were homeported in Florida and determining from Table 3 that 14% of the Florida vessels are homeported in the area of interest, data in Table 1 and Table 3, using the estimates of total snapper-grouper vessels from Table 2 it is estimated that approximately 254 vessels ($0.75 \times 2422 \times 0.14$) were homeported in the area of interest in 1993 and 290 vessels ($0.75 \times 2764 \times 0.14$) were homeported here in 1995. Combining the estimates of average ex-vessel revenues for the two periods with the estimates of vessels, the average ex-vessel revenue per vessel was approximately \$9,961 for 1991-1993 and \$6,483 1995-1997, or a decline of approximately 34.9%. Assuming that the net revenue margin (net of routine trip costs and crew and captain's wages) is 8.3% of gross ex-vessel revenues, as derived from Table 25c in SG-13A, the resultant net revenue profiles for these two periods are \$827 and \$538 per vessel for before the prohibition and after the prohibition, respectively. Since conversion of ex-vessel revenue to net revenue involved a simple uniform transformation (multiplication by 8.3%) for both periods, the percent reduction remains unchanged from that of the change in average ex-vessel value, 34.9%. In reality, however, the cost profile after the closure may actually have been worse such that an 8.3% margin is too high since it is derived from data prior to the action, which presumably forced vessels to fish in areas other than where they previously typically fished, hence increasing their cost of operation. So, while total harvests and revenues across the two periods should still be accurate, the impacts on net position may be understated.

It should be noted that, since the ex-vessel and net revenue estimates in the previous paragraph are averages, some vessels will perform better and some worse than the average. Actual performance figures per vessel are not available so the actual range of performance cannot be determined. Nevertheless, the first thing that should be obvious from examination of the values is that the values are sufficiently low such that most vessels most certainly operate in other fisheries in order to make a reasonable wage.

As noted in Section 1.2.1, harvest performance since 1995-1997 has remained below that of 1991-1993 and actually worsened. Recognizing that stock conditions and not just management measures can contribute to declining harvest performance, nevertheless, although additional management measures were implemented post-1995-1997, it is presumed that the impacts of the prohibition and associated regulations on harvests and revenues have continued throughout the prohibition, i.e., they were not temporary in nature and the current harvest performances are not attributable solely to subsequent measures/fishery conditions. Thus, the presumption is that lifting any of these restrictions, including the prohibition, would allow recovery of some portion of these losses.

Given the description of harvest performance before and after the prohibition and associated regulations, it should be obvious that a substantial decline in economic performance of the snapper-grouper commercial fishery in the area of interest occurred in 1995-1997 relative to conditions in 1991-1993. The key question, however, is what portion of these impacts can be directly associated with the prohibition and associated actions and how to extend these impacts to the discussion of continuing or sunseting the prohibition. It should be recalled that three key actions occurred relative to the *Occulina* area and only one is scheduled to sunset. The key actions are the prohibition of fishing for or possession of snapper-grouper, the prohibition of anchoring, and the restriction to harvest using only vertical hook-and-line gear. Of these three

actions, only the prohibition for fishing and possession of snapper-grouper is scheduled to sunset. It can be argued that anchoring and gear restrictions themselves created the greatest impediment to fishing behavior in the area since fishing in the area would be restricted to trolling, and deep planer trolling, specifically, if snapper-grouper were the target species. While some harvest of snapper-grouper using this method would have been expected, had it been allowed, as the non-traditional method of snapper-grouper harvest, it is unknown whether such harvest would have been cost effective relative to relocation. The most that can be said, therefore, is that some mitigation of harvest declines may have occurred after 1994 had only the anchoring and gear restrictions been implemented, but the amount of mitigation cannot be determined, though it is not expected to have been substantial given the fishing behavioral/methodological implications of the anchoring and gear restrictions.

The assumption is made, therefore, that the anchoring and gear restrictions had the greater impact on restricting fishing behavior for the commercial sector. Since these restrictions will continue regardless of the outcome of the proposed action, their impact would continue as well. Allowing the prohibition to sunset, however, would allow vessels to re-enter the area and harvest snapper-grouper using the deep-planing method. Although the conventional wisdom might suggest that, despite the presence of the sunset provision, management trends are for more closed areas and/or continuation of existing closed areas, it is reasonable to assume that some entities have considered or are planning to re-enter the area, should the prohibition sunset. Re-entry, despite continuation of the other restrictions, would be motivated by the expectation that the improved species densities in the area are sufficient to overcome the added harvest expense of trolling. To the degree that this occurs, recovery of some portion of the losses described above would result. Since most of the losses are attributed to the anchoring and gear restrictions, however, this portion is expected to be small. Initially, however, the loss recovery would be expected to be greater than the respective average prohibition component lost in 1995-1997 (defined as that unquantifiable portion of the 34.5% reduction in lost ex-vessel revenues/net revenues attributable solely to the snapper-grouper harvest/retention prohibition) since the current snapper-grouper densities are expected to be higher than those of 1995-1997 and, thus, the catch rates would be expected to be higher. This condition would likely be temporary, lasting for an unknown period of time, until equilibrium is reached in the newly fished stock. This equilibrium would apply from both a biological perspective in the sense that the stock density itself will adjust to the added mortality, and from an economic perspective in that vessels will exit the area in favor of other areas, or fish there less frequently, as it becomes less economically efficient to do so.

So, some recovery of losses would occur should the prohibition sunset. It should be clear, however, since the more significant measures would remain in place (no anchoring and no bottom gear), that full recovery of the losses would not occur. Extending the prohibition, therefore, would forego the recovery of these losses. The proposed alternatives, other than the no action alternative, differ only in the duration of continuing the foregone recovery of these losses, with the preferred alternative and Alternative 5 continuing the situation indefinitely. Further, regardless of the duration selected, the prohibition could be in effect for an unknown shorter or longer period of time, subject to future Council action. What is important to acknowledge, however, is that although short-term increases in benefits (recovery of the foregone harvests/revenues resulting from the prohibition) could be realized by those who would fish the area at any point in the future should the prohibition be lifted, regardless of whether such occurred next year or 10, 20 or 50 years from now, it is not believed that these short-term

benefits exceed the unquantifiable benefits accruing to a continued prohibition through the provision of an insurance policy against future fishery collapse and a variety of use and non-use values associated with both stocks within the protected area itself as well as spillover into stocks in neighboring populations that this harvest would at least partially negate.

2.5 Public and Private Costs of Regulations

The preparation, implementation, enforcement, and monitoring of this or any Federal action involves the expenditure of public and private resources which can be expressed as costs associated with the regulations. The following costs associated with this action are derived from the original amendment, as augmented by the additional costs of this supplement:

Council costs of document preparation, meetings, public hearings, and information dissemination	\$40,000
NMFS administrative costs of document preparation, meetings and review	\$ 25,000
Law enforcement costs.....	0
TOTAL.....	\$ 65,000

2.6 Summary of Economic Impacts

The proposed action is expected to result in the foregone opportunity for vessels that might otherwise be expected to fish the *Oculina* area to achieve unquantifiable short-term increased benefits. These forgone benefits are not, however, believed to exceed the unquantifiable benefits accruing to a continued prohibition through the provision of an insurance policy against future fishery collapse and a variety of use and non-use values associated with both stocks within the protected area itself as well as spillover into stocks in neighboring populations that this harvest would at least partially negate. The absence of more specific detailed data, however, prevents a precise quantitative assessment of the specific costs and benefits from being presented.

2.7 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it: (1) has an annual effect on the economy of \$100 million or more or adversely affects in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) creates a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alters the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) raises novel

legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in E.O. 12866.

Total commercial ex-vessel revenues from the Florida east coast in the area of direct interest to the proposed action for 1999-2001 averaged less than \$1.5 million. In the recreational sector, the estimated gross revenues for the charter sector operating in this area average less than \$2 million per year, while expenditures by private anglers are estimated at less than \$4 million per year. While precise measures of the impacts of the proposed action cannot be developed, current business practice will be allowed to continue, with impacts only taking the form of minor foregone revenue opportunities. Thus, the \$100 million threshold will clearly not be met. Further, current fishing behaviors and practices can continue. Therefore, productivity, competition, jobs are not expected to be materially affected.

Measures in this amendment do not interfere or create inconsistency with any action of another agency, including state fishing agencies, or materially alter budgetary entitlements, grants, user fees, or loan programs. The proposed action will continue harvest restrictions that have been in place almost 10 years and, further, represents a form of fishery management that has become a standard option. The proposed action does not, therefore, raise novel legal or policy issues.

Given the above findings, it is, therefore, determined that the proposed rule, if implemented, would not constitute a "significant regulatory action."

3.0 Regulatory Flexibility Act Analysis

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration. The RFA does not contain any decision criteria; instead, the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the FMP or amendment (including framework management measures and other regulatory actions) and to ensure that the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct a regulatory flexibility analysis for each proposed rule. The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. In addition to analyses conducted for the RIR, the regulatory flexibility analysis provides: (1) a description of the reasons why action by the agency is being considered; (2) a succinct statement of the objectives of, and legal basis for the proposed rule; (3) an identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule; (4) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; (5) a description of the projected reporting, record-keeping, and other compliance requirements of the final rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; (6) a description of significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities.

Statement of need for, objectives of, and legal basis for the rule: The purpose and need, issues, problems and objectives of the proposed action are provided in Section 1.2 of SG-13A and are incorporated herein by reference. In summary, the proposed action is for the purpose of producing a hedge against the uncertainty inherent in stock assessments and to provide the highest protection in the *Oculina* coral habitat in the closed area. The Magnuson-Stevens Act, as amended, provides the statutory basis for the proposed rule.

Identification of all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule: No duplicative, overlapping, or conflicting Federal rules have been identified.

Description and estimate of the number of small entities to which the proposed rule will apply: There are two general classes of small business entities that would be directly affected by the proposed rule, commercial fishing vessels and for-hire fishing vessels. The Small Business Administration defines a small business that engages in the charter fishing as a firm that is independently owned and operated, is not dominant in its field of operation, and has annual receipts up to \$6.0 million per year. The revenue benchmark for a small business that engages in commercial fishing is a firm with receipts up to \$3.5 million.

There were 1,174 commercial vessels that participated in the snapper-grouper fishery in the South Atlantic during 2002. Of these vessels, 120 were homeported in the area of interest. Previous studies on the snapper-grouper fishery operating in the South Atlantic have determined that these vessels have an average annual gross and net incomes for vessels operating south of St. Augustine, FL, an area which encompasses the area of interest, estimated at approximately \$39,745 and \$12,388, respectively. It is, therefore, assumed that all commercial fishing entities that would be affected by the proposed rule are small entities.

For the for-hire sector, 1,221 snapper-grouper for-hire permits were issued to vessels in the southern Atlantic states in 2002. Of this total, 94 permits were issued to for-hire vessels in the area of interest. These vessel comprise two types of business operations, charterboats, which are smaller vessels (6 or fewer passengers) that book trips on a vessel basis, and headboats, which are larger vessels that book passage on an individual angler basis. The average gross revenue for charterboats operating off the Atlantic coast of Florida is estimated at \$52,000, while that of headboats is estimated at \$141,000. All for-hire vessels that would be affected by the proposed rule are, therefore, assumed to be small entities.

The number of commercial and for-hire vessels that would fish in the closed area should the area reopen after the current rule sunsets is not known. However, all entities in the area of interest have the potential to enter the area, should sunset occur. Since all such entities would be covered by the proposed rule and all said entities are small entities, it is concluded that a substantial number of small entities would be affected by the proposed rule.

Description of the projected reporting, record-keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records: The proposed rule does not impose any reporting or record keeping requirements.

Significant Economic Impact Criterion: The outcome of "significant economic impact" can be

ascertained by examining two issues: disproportionality and profitability.

Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?

All the entities affected by the proposed rule are considered small entities so the issue of disproportionality does not arise in the present case.

Profitability: Do the regulations significantly reduce profit for a substantial number of small entities?

The impact on the current profitability of vessels in the commercial hook and line snapper-grouper fishery that are likely to be affected by this measure is unknown. It has been estimated that vessels in the southern area of Florida earn an average of approximately \$17,000 (revenue net of routine trip costs expressed in 2001 dollars) from harvesting mid-shelf snapper-grouper species. This does not represent the vessel's overall annual profitability since vessels in this fishery earn additional revenue from other fisheries. Furthermore, this estimate represents profitability of the mid-shelf trips during 1997, which may be different in 2002 due to fishery regulations and other changes in the economic environment after 1997. A more recent estimate of vessel profitability estimated the current net revenue per vessel from snapper-grouper fishing in the area of interest at approximately \$10,000. Again, this estimate, however, does not represent the total annual net cash flow for the average commercial vessel since it does not include additional net revenue from participation in other fisheries. Also, some commercial vessels earn additional revenue from for-hire services at certain times of the year.

Net revenues for vessels operating in the for-hire sector are not known. However, the average gross revenue per vessel in the charterboat sector for the Atlantic coast of Florida is estimated to be approximately \$57,000 (2001 dollars). The average annual variable costs for these vessels for fuel and oil, bait, food and drink, ice and wages and salaries in 1997 has been estimated to be approximately \$42,000 (2001 dollars). Thus, using these figures, average net revenue for these vessels is approximately \$15,000. Again, as with commercial vessels, some charter vessels also operate in the commercial harvesting sector and obtain revenue from the sale of commercially harvested species. Thus, the average net annual cash flow for these vessels is higher than this value. For headboats, the respective numbers are approximately \$155,000 (2001 dollars) in average gross revenues and approximately \$86,000 (2001 dollars) in average annual variable costs. Thus, the average annual net revenue for these vessels is approximately \$69,000.

It must be emphasized, however, that the proposed rule will not affect current business operation and, thus, is not expected to affect current profitability. To the extent that current entities participating in the snapper-grouper fishery have developed plans to fish the area upon sunset, the proposed rule would require cancellation of those plans and, therefore, potentially impact future profitability. Planned entry into the area, however, is not expected to be great. It is not possible to estimate the change in net profits that is anticipated or would result with any certainty because the actual fishing effort that would be directed at snapper-grouper species in the area is unknown. Also, even if these estimates were available, the incremental change in net vessel profits would depend on whether overall vessel effort increased or whether there was simply a displacement of effort from outside of the area into the area, the resultant impact on travel cost to the area, and the comparative quality of fishing within the area. Otherwise, though, all entities

can continue to fish in location, manner and frequency that they currently operate.

Although current fishery participation and fishing practices would be allowed to continue under the proposed rule, it is not known with reasonable certainty how many entities are planning to or would be expected to fish in the area should sunset occur, particularly given the continuation of two restrictions, an anchoring prohibition and a gear restriction. Further, it cannot be stated with certainty what impact fishing in this area would have on the profitability of these entities and others who continue to fish outside the area. Therefore, it is unknown whether the proposed rule would result in a significant impact on a substantial number of small entities and an IRFA has been prepared.

Description of Significant Alternatives: Section 2.0 of this document contains a description of the alternatives to the proposed rule. The alternatives, other than the no-action alternative, differ only in the duration of the prohibition. The alternatives, therefore, are expected to have the same effect on short-term profitability as the preferred alternative. None of the alternatives, however, would adversely affect current profitability but would, instead, eliminate potential increased short-term profits that might be derived from fishing activity directed into the *Oculina* area, should sunset occur. The no-action alternative would allow for these potential short-term increases in profits to occur. However, if snapper-grouper populations become depleted as a result of directed effort inside the area, the short-term gains will dissipate. Further, these foregone potential short-term profits are not believed to be greater than the benefits that accrue to continued protection of the resource and area. This relationship persists no matter how long the prohibition continues. The Council recognizes, however, that periodic assessment of conditions, with a comparison of the costs and benefits of the prohibition, best suits management needs. Therefore, the proposed rule best meets the Council's intent.